NOTE

This Microfiche meets the quality requirements of the American National Standard for Microfiche of Documents (ANSI PH5.9-1975). However, because of imperfections in the document from which it was made, it contains images that are illegible or difficult to read. The source document for this microfiche is the best copy that could be obtained prior to filming.

Congressional Information Service, Inc.
4520 East-West Highway
Bethesda, Maryland 20814

CIS

S. Hrg. 102-5 (Pt. 14)

NATIONAL ENERGY SECURITY ACT OF 1991

(Appendixes to Parts 1, 2, 3 and 4)

HEARINGS

BEFORE THE

COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE

ONE HUNDRED SECOND CONGRESS

FIRST SESSION

ON

Appendixes to S. 341

PERTAINING TO

Part 1

OVERVIEW (FEB. 21)

Part 2

TITLE III AND SUBTITLES A AND B OF TITLE IV (FEB. 26)

Part 3

SUBTITLE C OF TITLE IV AND SECTION 10003 OF TITLE X (FEB. 26)

Part 4

SUBTITLE A OF TITLE XI (FEB. 28 AND MAR. 20)

PART 14

Printed for the use of the
Committee on Energy and Natural Resources

U.S. GOVERNMENT PRINTING OFFICE
43-268 ⇆ WASHINGTON : 1991

S311-51

For sale by the Superintendent of Documents, Congressional Sales Office
U.S. Government Printing Office, Washington, DC 20402

COMMITTEE ON ENERGY AND NATURAL RESOURCES

J. BENNETT JOHNSTON, Louisiana, *Chairman*

DALE BUMPERS, Arkansas
WENDELL H. FORD, Kentucky
BILL BRADLEY, New Jersey
JEFF BINGAMAN, New Mexico
TIMOTHY E. WIRTH, Colorado
KENT CONRAD, North Dakota
DANIEL K. AKAKA, Hawaii
WYCHE FOWLER, Jr., Georgia
RICHARD C. SHELBY, Alabama
PAUL WELLSTONE, Minnesota

MALCOLM WALLOP, Wyoming
MARK O. HATFIELD, Oregon
PETE V. DOMENICI, New Mexico
FRANK H. MURKOWSKI, Alaska
DON NICKLES, Oklahoma
CONRAD BURNS, Montana
LARRY E. CRAIG, Idaho
JOHN SEYMOUR, California
JAKE GARN, Utah

Benjamin S. Cooper, *Staff Director*
D. Michael Harvey, *Chief Counsel*
G. Robert Wallace, *Staff Director for the Minority*
Gary G. Ellsworth, *Chief Counsel for the Minority*

CONTENTS

FEBRUARY 21, 1991

(Overview)

Page

Appendix I—Responses to additional questions from:
  James D. Watkins, Secretary, Department of Energy 1
Appendix II—Additional material submitted for the record 124

FEBRUARY 26, 1991

(Title III and Subtitles A and B of Title IV)

Appendix I—Responses to additional questions from:
  J. Michael Davis, Department of Energy 163
  Gregory M. Rueger, Sr., Pacific Gas and Electric Co 234
  Scott Sklar, Solar Energy Industries Assoc 246
  Dick Watson, NARUC 251
  James L. Wolf, Alliance To Save Energy 260
Appendix II—Additional material submitted for the record 273

FEBRUARY 26, 1991

(Subtitle C of Title IV and Section 10003 of Title X)

Appendix I—Responses to additional questions from:
  G. Edward Dickey, Department of the Army 463
  Kevin Kelly, Department of Energy 465
  Gail Ann Greely, National Hydropower Association 468
  Dennis B. Underwood, Department of the Interior 472
Appendix II—Additional material submitted for the record 474

FEBRUARY 28 AND MARCH 20, 1991

(Subtitle A of Title XI)

Appendix I (Feb. 28)—Responses to additional questions from:
  Jerry Ralph Curry, Department of Transportation 543
  Steven Plotkin, Office of Technology Assessment 554
  Philip M. Smith, National Research Council 581
  Owen Bieber, UAW 585
  Daniel A. Lashof, NRDC 592
  Ronald R. Boltz, Chrysler Motors 597
  Peter J. Pestillo, Ford Motor Co 617
  General Motors 630
  John E. Reilly, Association of International Automobile Manufacturers 654
Appendix II (Mar. 20)—Responses to additional questions from:
  Steve Plotkin, Office of Technology Assessment 670
  K.G. Duleep, Energy and Environmental Analysis, Inc 684
  Ronald R. Boltz, Chrysler Motors 695
  James R. Olson, Toyota Motor Sales, U.S.A 702
  John M. DeCicco, American Council for an Energy-Efficient Economy 717
Appendix III—Additional material submitted for the record 727

APPENDIXES TO FEBRUARY 21, 1991 HEARING

(Overview)

Appendix I—Responses to Additional Questions

Department of Energy
Washington, DC 20585

March 19, 1991

The Honorable J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

On February 21, 1991, Admiral Watkins testified before your Committee on the Administration's National Energy Strategy.

Following the hearing, you submitted written questions on behalf of yourself and Senators Ford, Wirth, Bingaman, Fowler, Nickles, Hatfield, Murkowski, Seymour and Wallop to supplement the record. Enclosed are the answers to the questions with the exception of your question 1 (Oil Pipeline Deregulation), question 2 (Enhanced Oil Recovery), and question 2 (ANWR); Senator Wirth's questions 7, 8, 12, and 13, and Senator Wallop's question 1. These answers are still being prepared and will be forwarded to you as expeditiously as possible.

If we can be of further assistance to you or your staff, please contact our congressional hearing coordinator, Barbara Barnes, on (202) 586-6341.

Sincerely,

Jacqueline Knox Brown

Jacqueline Knox Brown
Assistant Secretary
Congressional and Intergovernmental
Affairs

Enclosures

QUESTION FROM SENATOR JOHNSTON

Q. 1. What is the Administration's time table for carrying out those NES initiatives that can be undertaken administratively?

A. Full implementation of the NES is inherently a shared responsibility, involving the completion of hundreds of actions by many actors. Attached is a preliminary list of those NES items not requiring legislation. We are moving ahead with all deliberate speed on working this list into final form. Some initiatives such as the issuance of an Executive Order on Federal Energy Management, and a comprehensive analysis of fuel cycle costs are already well underway. The Secretary of Energy has begun tasking the pertinent Departmental elements responsible for each of these items with developing implementation plans and carrying them out. This includes, as appropriate, time tables and specific milestones. These plans are not yet fully developed and, hence, the specific time table information requested is not yet available. However, we will forward this information to the Committee as it becomes available. We hope to have this list finalized by April 1, 1991.

National Energy Strategy
Action to be Undertaken by the Administration

1. Request Power Marketing Administrations to Promote Integrated Resource Planning (IRP) among their customer utilities.
2. Foster IRP Through Regulation of Wholesale Power Markets
3. Expand Access to Electricity Transmission
4. Improve Siting of New Generation Plants and Transmission Lines
5. Expand Use of Mortgage Financing Incentives for Efficient Homes
6. Improve Energy Efficiency of Public Housing
7. Set Cost Effective Appliances/Equipment Standards
8. Develop Model Building Efficiency Standards
9. Increase Federal Energy Efficiency
10. Increase R&D for Industrial Processes Efficiency
11. Increase Waste Minimization R&D
12. Expand Industrial Energy Audits
13. Increase R&D for Advanced Transportation Engine Technology
14. Accelerate Scrappage of Older Cars
15. Evaluate Corporate Average Fuel Economy Standards
16. Improve Consumer Fuel Efficiency Information
17. Provide Incentives for Mass Transit and Ride Sharing
18. Increase Oil Production Outside Persian Gulf
19. Expand Strategic Petroleum Reserve
20. Diversify Transportation Fuels and Technology
21. Increase Purchase of Federal Alternative Fuel Vehicles
22. Remove Barriers to Horizontal Drilling
23. Increase Production of California Heavy Oil
24. Increase Alaska North Slope Oil Production
25. Deregulate Pipeline Sales Rates
26. Reform Natural Gas Pipeline Rate Design
27. Encourage Export of U.S. Coal and Coal Technology
28. Encourage Exports of U.S. Renewable and Efficiency Technology
29. Develop New, Passively Safe Nuclear Reactors
30. Increase R&D for Renewable Technology
31. Increase R&D for New Energy Crops
32. Increase R&D for Electric Vehicles, Gas Turbines and Fuel Cells
33. Pursue High Speed Rail and Magnetic Levitation Research
34. Enhance R&D for Aircraft Engines and Bodies
35. Expand Use of Intelligent Vehicles/Highway System
36. Increase R&D for Telecommuting
37. Increase Efficiency of Air Traffic Control System.
38. Increase R&D for Enhanced Oil Recovery
39. Pursue R&D on Magnetic and Inertial Confinement Fusion Concepts
40. Maintain Basic Federal Research Portfolio
41. Strengthen University Research
42. Undertake a Comprehensive Analysis of Fuel Cycle Costs
43. Pursue International Collaboration for High Cost/Long Term Research Facilities
44. Increase Industry Participation in R&D
45. Ensure Protection of Intellectual Property
46. Increase Federal Technology Transfer
47. Increase Federal Support of Math and Science Education
48. Clarify "New Source Review" Provisions for Existing Power Plants
49. Allow Access to Portions of Outer Continental Shelf

Note: R&D and oil purchase funding increases require appropriations.

Questions from Senator Johnston

Question 3: Alternative Fueled Fleets. -- The NES contains what appears to be a broad-sweeping provision for alternative-fueled fleets.

- How much oil would be displaced under your program?
- What alternative fuels are most likely to be used under your program?
- Is there likely to be a problem with having the infrastructure in place so that the fuels are available?

Answer: We estimate that the alternative fueled fleet program will displace about 300 thousand B/D in the year 2005, rising to 350 thousand B/D by 2010, assuming all covered fleet vehicles use alternative fuels and that waivers are not granted because of a lack of vehicles. We expect that a wide range of fuels will be used including natural gas, methanol, electricity, propane and ethanol.

All of the fuels mentioned above are already available in varying degrees, in locations throughout the U.S. The phase-in of the alternative-fueled vehicle purchase requirements is such that there will be adequate lead time for various fuel suppliers to expand the fuel distribution systems in parallel with the increasing vehicle populations.

In addition to alternative fuel use in covered fleets, other NES alternative fuel initiatives are expected to result in the widespread production of fuel flexible or dual fueled vehicles and the availability of domestically produced alternative fuels from bio feedstocks. The CAAA, the NES fleet program, and the NES incentives to produce fuel flexible vehicles are synergistic measures that help each other succeed and would result in substantial oil displacement. We expect that the vehicle manufacturers will respond to our incentives by gradually shifting light duty vehicle production to fuel flexible or dual fueled vehicles. While we don't expect that the general public will immediately shift away from gasoline as their primary fuel, we estimate that, by 2010, an additional 1 million barrels per day of oil use will be displaced, even though these vehicles may use gasoline 75% of the time. By 2010, we expect that the first fruits of DOE's bio-alcohol research program will result in 100 thousand barrels per day of additional supplies. This is expected to grow rapidly after 2010. Taken together, the CAAA and the NES will displace over 2 million barrels per day by 2010. Of this displacement, 1.5 million barrels per day are expected to result from the NES proposed initiatives.

Questions from Senator Johnston

Question 4: General -- Several of your initiatives rely on giving consumers information that you believe will influence their behavior. An example of this would be appliance efficiency labeling.

What assumptions do you make regarding changes in consumer behavior that will lead to energy savings?

Answer: In general, DOE does not assume that product labeling or other information-based initiatives will result in changes in consumer behavior that can be easily predicted or measured. We also do not assume that such initiatives result in the implementation of all cost-effective efficiency improvements, although there is evidence that such initiatives can result in savings that significantly exceed the costs of providing the information. The use of labeling, rather than mandatory standards, acknowledges the fact that consumers often have other decision criteria besides cost. The presence of labels, however, tends to heighten consumer awareness of energy costs as on important decision factor.

With respect to the proposal to require the efficiency labeling of equipment used primarily in the commercial sector, the quantitative analysis of the NES makes no specific assumptions about the energy savings likely to result.

In the **residential sector**, there is some anecdotal evidence that energy labels increase consumer awareness of energy costs, and thus may make it easier for manufacturers to introduce new, energy-efficient product lines in advance of efficiency standards. The Federal labels (and the DOE testing program that underlies both labels and standards) have also provided the technical "yardstick" used by a large number of utility rebate programs to encourage purchase of energy-efficient models.

In the **commercial sector**, some voluntary industry programs already exist for testing and labeling of motors and certain other equipment, but DOE is not aware of any evaluation of their effects. It seems reasonable to assume, however, that businesses will include some consideration of life-cycle costs in their purchasing decisions. Specific testing provisions for each major equipment category, the range of efficiencies currently on the market, and the degree to which test data are made available to and used by different types of purchasers, will be assessed in detail as an early step in implementing this NES option.

It is expected that efficiency testing and labeling will have more impact on certain commercial/institutional markets than in the residential sector, because of the greater cost-consciousness of the energy managers, procurement specialists, and other professionals in this sector. The impact of testing and labeling may also be increased to the extent that this market information permits or stimulates other measures, such as utility rebates and other incentives, tighter Federal procurement criteria or improvements in the equipment efficiency requirements of state and local building codes. However, where energy costs are small compared with other business costs, the impacts of information-only strategies such as labeling will be limited by the same constraints found in the residential sector. At the same time, when the amount of energy use affected is small, a Federal efficiency program may not be needed or appropriate.

There are other NES initiatives that are intended to encourage energy conservation by providing energy users with more complete and reliable information on the opportunities for improving energy efficiency, including elements of the proposal to expand the use of mortgage financing incentives for residential energy efficiency, the proposal to expand and develop energy audits for industry and DOE's efforts to improve consumer information on fuel economy and system efficiency.

In general, the NES makes no assumptions regarding the energy savings that will result from these initiatives or assumes that their impact is likely to be limited. For example, DOE's analysis of the proposal to expand the use of mortgage financing incentives for residential energy efficiency assumed that the widespread availability of such mortgage incentives and the necessary information on home energy efficiency might help improve the efficiency of 20-25% of the single family homes sold each year. But even for these homes it is not assumed that information alone would result in the implementation of all cost-effective efficiency improvements. Cost-effectiveness does not necessarily equate to consumer affordability or desirability, and it is not DOE policy to force undesirable features or practices on homeowners, nor to raise the cost of home ownership, which is already a serious problem for many Americans.

QUESTIONS FROM SENATOR JOHNSTON

Question: # 5 FERC -- The White House fact sheet on the NES states that the Administration will propose "bringing the Federal Energy Regulatory Commission into DOE".

- Could you please describe this proposal in more detail?

Answer: The incorporation of the Federal Energy Regulatory Commission ("FERC" or "the Commission") as an executive (rather than independent) agency within the Department of Energy (DOE) complements the reform and streamlining of the regulatory infrastructure for the natural gas and hydroelectric power industries contained in the National Energy Strategy. The restructuring of FERC would facilitate expeditious regulatory decisionmaking, which would occur under the proposed natural gas and hydroelectric reforms. The new Natural Gas and Electricity Administration (NGEA) would be designed to handle a significantly reduced volume of contested proceedings which, under the proposed reforms, would be far less complex than the current practice of protracted, multi-party hearings at FERC.

Under this proposal, NGEA would become an executive

Administration within DOE. This new administration would be headed by an Administrator, who would report to the Secretary and participate in key policy decisions made through DOE's existing policy-making framework. However, the Secretary would be responsible for that policy, subject to the normal guidance the President exercises over his cabinet members.

Individual proceedings requiring impartial adjudicative hearings would be conducted by administrative law judges ("ALJs") within DOE, and their decisions would be subject to review by the Administrator, as the delegate of the Secretary. The Administrator, subject to direction of the Secretary, also would be responsible for overseeing the proper implementation of policy, as promulgated by the Secretary, in those hearings. However, appropriate procedures, similar to those utilized by other agencies and departments, would be put in place to ensure adjudicative and administrative independence of ALJs. The Administrator would be responsible for the prompt processing of all applications filed with the agency, including the assignment, where appropriate, of matters to ALJs for hearings and for ensuring that the staff of the Administration is seeking to implement properly the policy directives of the Secretary. Procedural due process under current law, including the right to judicial review, would be maintained.

QUESTIONS FROM SENATOR JOHNSTON

Question 6: Costs.-- What are the total estimated costs (increased expenditures and decreased revenues) to the federal government of implementing the initiatives contained in the NES?

o Please also provide this information for the initiatives in each of the following categories: energy efficiency; renewable; hydropower; coal; electricity; research and development; natural gas; transportation; and nuclear.

o How does the administration propose to pay for the cost of implementing the NES?

Answer: The FY 1992 Federal budget request includes $903 million, an increase of $227 million or 34 percent, for increased investments in support of NES R&D initiatives government-wide. Of the of $903 million total, $653 million (an increase of $134 million or 26 percent) is in the DOE budget for specific NES initiatives related to displacing oil in transportation, increased efficiency in buildings and industry and advanced electricity technology.

A review by the categories requested follows:

	Dollars in millions FY 1992
Energy Efficiency	$157
Renewable	29
Electricity (includes $241 for Nuclear)	314
Transportation	153
Total	653

Other funding not directly related to the above enhanced R&D initiatives include:

Hydropower	1
Coal R&D	115
Natural Gas	63
Total	179

The DOE FY 1992 budget request can be met from current revenue sources. The administration is currently reviewing how to pay the cost of implementing the NES in the out-years. For FY 1993 through FY 1996, the estimate of the NES related budgetary incrase over the base is $1.3 billion dollars. Clearly, because of the Budget Reconciliation Act of 1990, offsets from other lower priority areas within the Federal budget will need to be identified to allow funding of NES initiatives.

The NES also generate revenues. It is estimated that $3.6 billion can be forthcoming over the next 5 years as a result of leasing the coastal plain of the Arctic National Wildlife Refuge, selected portions of the Outer Continental Shelf, and the Naval Petroleum Reserve at Elk Hills.

QUESTIONS FROM SENATOR JOHNSTON

Oil Pipeline Deregulation: Why is this necessary:

Question 2. Isn't this the same oil pipeline deregulation bill that went nowhere in the past two Congresses?

Answer: The NES proposal is essentially the same as the oil pipeline deregulation proposal contained in legislation submitted by the Administration in the past two Congresses. The National Energy Strategy presents an opportunity to resolve, in a balanced and comprehensive way, numerous energy policy issues, including unnecessary regulation of oil pipelines, which have not received Congressional attention in recent years.

The Administration's proposal strikes a balance regarding oil pipeline deregulation by proposing to deregulate only those markets that are competitive. Pipelines would continue to be regulated in markets that are not competitive; however, the regulation would be more effective and less burdensome.

QUESTIONS FROM SENATOR JOHNSTON

Question 1: As I understand it, the Administration's energy plan assumes that all of the revenues generated from the leasing, development and production of oil and gas from ANWR will go to the Federal government as miscellaneous receipts in the Treasury. I met with Alaska's Governor Hickle several weeks ago and he contends that 90% of that revenue should go to the State of Alaska.

I can assure you that neither the State nor the Federal government is going to get all or almost all of these revenues. The legislation I have introduced calls for a 50-50 split between the State and the Federal government which seems reasonable to me. While I can understand the arguments made by both sides, I urge all parties not to lose sight of the main objective of both bills which is to enhance America's energy security by developing the most promising onshore oil and gas area left in the United States.

Please comment.

Answer 1: I share your view that the opening of ANWR to environmentally sound oil and gas exploration is critical for the country. The oil potential of the area is the largest of any frontier area in the nation. There is a 46% chance that economically recoverable oil will be found, and, if so, then the mean estimate of the amount of recoverable oil expected is 3.6 billion barrels. Only two states outside Alaska -- Texas and California -- have proved oil reserves that exceed that amount and, if economically recoverable oil is found, no state, including Alaska, has proved reserves that exceed the 5% chance that 8.8 billion barrels may be within ANWR.

We have two comments regarding revenues. First, we do not believe that the disposition of Federal revenues should stand in the way of the development of this resource for the benefit of the nation. Second, the Administration's proposed NES legislation provides that all the bonus, rental and royalty revenue should accrue to the general fund. The Administration recognizes that other legislation in Congress would authorize 50-50 receipt sharing with the State of Alaska and that Alaska officials are proposing even more favorable terms for the State. We plan to work with Congress to resolve this issue in a manner that is fair to the citizens of Alaska.

QUESTIONS FROM SENATOR JOHNSTON

Question: I am concerned about whether the initiatives contained in your National Energy Strategy are consistent with the budgetary realities and policy decisions contained in the Administration's fiscal year 1992 budget request.

Please provide for the record an explanation of how each of the provisions of your National Energy Strategy, program by program, are reconciled with the budgetary realities and policy decisions contained in the FY-92 budget request.

If there are program goals not currently supported by the Administration's budget request, does the Department intend to request new funding authority? Will this be included in the legislative package?

Answer: Of the $903 requested in the FY 1992 budget for NES R&D initiatives, $653 million is requested by DOE. An additional $1.3 billion above the FY 1992 base funding is estimated for the FY 1993-96 period to complete these initiatives. Goals not specifically funded in FY 1992 will be supported in future year DOE budgets.

For the most part, the DOE's base program and the NES have now been integrated. The following list shows funding levels for DOE energy related programs:

Program	Dollars in millions FY1992
Securing Future Energy Supplies	
Fossil Energy	$540
Nuclear Energy	432
Fusion Energy	337
Renewable Energy	166
Electric Energy Systems and Storage	38
Power Marketing Administrations	266
Total	$1778
Increasing Energy Efficiency	
Utility Sector	$ 7
Buildings Sector	54
Transportation Sector	111
Industrial Sector	102
In-House Energy Management	21
Policy and Management	4
Total	$298
Enhancing Environmental Quality	
Global Climate Change Research	77
Nuclear Waste Disposal	306
Total	$383

Fortifying Foundations

Fundamental Science Research	$2596
Technical Information Management	15
Total	$2611

At the present time, there is no perceived need to request new funding authority for the FY 1992 DOE budget request. Many of the above programs will require increased requests in the out-years to fully meet NES objectives.

QUESTIONS FROM SENATOR JOHNSTON

Question 1: The NES states that the NES's major effort in the coal sector is to continue implementing the clean coal technology program.

- o What level of funding will the NES propose for the program?
- o Does this include funding to complete the fourth and fifth rounds of the program?

Answer: The NES recognizes the importance of the role that coal plays as the primary electricity generation and industrial fuel, and supports regulatory and legislative reform actions that will maximize the impact of Federal and industry investments in coal research and development.

Funding proposed in the FY92 budget for the Clean Coal Technology (CCT) program, DOE's single largest RD&D investment, is $315 million. In FY93 $250 million is proposed as the final increment for fourth round projects. By the end of the fourth round, we will have exceeded the original goal of spending $5 billion in combined Federal and private sector funds. A decision on timing the fifth round will be addressed in the FY93 budget.

The NES proposes to address regulatory obstacles to the rapid deployment of CCTs by assessing the process by which public utility commissions and utilities evaluate investment risk in new technology. The results of this assessment are expected to assist State and industry decisionmakers to objectively respond to CCT opportunities.

The NES also calls for legislation to provide power of eminent domain for the construction of coal slurry pipelines. Such pipelines would increase competition in coal transportation,reduce costs to coal consumers, and increase coal use.

Other coal-related regulatory reform actions proposed in the NES include: streamlining Federal coal leases, reducing uncertainties about new environmental requirements on surface mining, elimination of obstacles to the use of new mining technology and techniques, and improving railroad workrules.

The NES calls for continued research on coal liquefaction with the aim of reducing production costs to the $30 per barrel oil equivalent level identified as feasible by the National Research Council.

Finally, the NES calls for efforts to export U.S.

coal and coal technology to meet increasing worldwide demand for electricity generation capacity. Pacific Rim countries alone are expected to need 60 gigawatts of new capacity by 2000. State of the art CCT can supply part of this demand while concurrently improving air quality in developing countries.

QUESTIONS FROM SENATOR FORD

Question: Your National Energy Strategy document stresses the important contribution of coal to the nation's energy supply and coal's competitiveness while meeting environmental, health, and safety requirements; and to create a favorable export climate for U.S. coal and coal technologies. Your document states further that the major effort in the coal sector is to continue implementation of the Clean Coal Technology Program.

The Administration's budget request for FY-92, however, would effectively terminate the clean coal program by suspending Round 5 of the program.

Please provide for the record an explanation of how each of the coal provisions of your National Energy Strategy are reconciled with the budgetary realities and policy decisions contained in the Administration's FY-92 budget request.

Will the legislative package to accompany the energy strategy contain provisions related to clean coal technology or other coal initiatives?

Answer: The FY 1992 Budget Request for coal, as included in the Office of Fossil Energy's request was prepared concurrently with the NES, and was integrated with the NES development. The FE R&D request for coal and the Clean Coal Technology request combines to support the goals outlined in the NES. These goals are to maintain coal's competitiveness while meeting environmental, health, and safety requirements and to create a favorable export climate for U.S. coal and coal technology. We do not believe additional legislation will be required to implement these goals. The FY 1992 request for coal R&D is $115 million and the request for Clean Coal Technology is $315 million (Round 4).

Based on its five-year history, the Clean Coal Technology Demonstration Program must be considered one of DOE's recent "success" stories. Its purpose is to co-finance with industry a series of pioneering projects that will demonstrate innovative methods for using coal cleanly and efficiently.

Since the program was conceived -- as a $5 billion industry/government commitment to the U.S./Canadian effort to resolve the transboundary problem of acid rain -- 35 projects, representing 10 major categories of technology, have been selected from three rounds of nationwide competition and are now active. By the time Round 4 projects are selected and negotiated, the program should have reached its $5 billion goal.

DOE is beginning to reorient both its Clean Coal Technology Demonstration Program and its Coal Research and Development Program toward technologies that can meet the environmental and energy supply demands of the next century. In addition to high levels of pollutant removal, the Department is also stressing power systems that operate at significantly greater efficiencies than today's conventional coal-burning processes (40-50% efficiency levels versus 33% for today's units).

Round 4 of the Clean Coal program is offering additional credit for technologies that achieve high efficiency levels. It is expected that Round 5, will likely also emphasize ultra-high efficiency processes. However, whether to proceed with Round 5 and on what schedule will be assessed in the FY 93 budget process. The Administration's request to delay issuance of the

Round 5 solicitation now scheduled for March 1992 is based on the fact that significant regulatory and policy events have rencently occurred (i.e. Clean Air Act, global warming concerns, etc.). Moreover, a delay will allow for technological feedback from prior rounds of demonstration and the maturation of those breakthrough technologies not yet ready for demonstration, some of which are mentioned below. The Administration believes it to be prudent to pause and assess where we are, what projects are selected in Round 4 and how Round 5 should be focussed before we proceed.

The FY 1992 coal research and development budget also is being reoriented to place greater emphasis on technologies that will maintain coal's competitiveness in the 21st century.

Although overall proposed budget levels have been reduced, reflecting deficit reduction requirements, the FY 1992 coal research and development program will continue to sponsor the types of technologies encouraged in the NES:

a) extremely effective flue gas cleanup technologies (with a greater degree of sulfur capture than today's scrubbers and with the integration of nitrogen oxide controls);

b) more efficient "hot gas" cleanup techniques that can improve the cost-effectiveness and environmental performance of advanced power generating equipment such as gasification-combined cycle and pressurized fluidized bed technology;

c) higher-performance combustion and conversion processes, such as advanced generation fluidized bed concepts, low-emission boiler systems; and high efficiency gasification systems;

d) advanced generations of fuel cells; and

e) improved techniques for producing high quality liquids from coal and;

f) techniques for removing and disposing of CO_2 from coal combustion sources.

QUESTIONS FROM SENATOR WIRTH

Question 1:	**How much of the energy use reductions, domestic energy production increases, oil use reductions and domestic oil production increases incorporated in the results shown for the National Energy Strategy are attributable to legislation or initiatives already in place, such as the Clean Air Act Amendments of 1990, the tax provisions of the Omnibus Reconciliation Act of 1990, sections 109, 110, 946, and 961 of the National Affordable Housing Act of 1990, etc.?**
Answer:	The bulk of the increase in oil production is due to the combined oil supply options in the Strategy, including the enhanced oil R&D, ANWR access and federal OCS access actions. Although it is impossible to make precise estimates of the contribution of each law, we ran a scenario of "current laws only" in response to this question. Only about 10% of the total production increase attributable to the Strategy appears due to current laws and initiatives. Based on this scenario of current laws only, it appears the oil and gas and ethanol tax provisions of the Omnibus Budget Reconciliation Act of 1990 result in an estimated 0.4 MMBD of additional oil production in 2000, declining to 0.1 MMBD by 2010. This scenario also appears to indicate that, in the early years, about 45 percent of the reduction in oil demand is due to the Clean Air Act Amendments. Of the estimated 1.3 MMBD reduction in 2000, 0.7 MMBD is due to oxygenates in reformulated gasoline,

assuming full opt-in of over 100 cities into this program. However, by 2010, only about 20% of the reduction is due to the Clean Air Act Amendments. Of the 3.4 MMBD of oil savings in 2010, 0.6 MMBD is due to reformulated gasoline, 0.1 MMBD is due to alternative fuels use brought about by the amendments, and less than 50,000 B/D is due to the National Affordable Housing Act, while 2.7 MMBD is due to new oil conservation and fuel switching Strategy actions.

QUESTIONS FROM SENATOR WIRTH

Q. 2. Please explain the criteria (or process, if there were no criteria) used to select or reject options for inclusion in the final NES from those listed in the Interim Report.

A. The general criteria used to select and reject options for inclusion in the National Energy Strategy was set forth by President Bush in his Charter for the NES:

> "A keystone of this strategy is going to be the continuation of the successful policy of market reliance. We must balance our increasing need for energy at reasonable prices, our commitment to maintain an economy that is second to none, and our friends and allies on potentially unreliable energy suppliers"

The Interim Report was a compilation of public comments. It listed hundreds of sometimes contradictory "publicly identified options." This set of options was then narrowed into a manageable number.

The Department and the Economic Policy Council (EPC) developed an initial set of options to be analyzed that bracketed the full spectrum of issues identified in the public consultation process. More specific analytical criteria were then developed, in agreement with the EPC (OMB, Treasury, and CEA in particular), aimed at assessing the potential contribution of the various combinations or "bundles" of options to the NES's overall economic, energy security, and environmental goals. More specifically, evaluation criteria included net national economic benefits (including macroeconomic effects on growth, consumers, and producer suppliers), energy security impacts, environmental impacts, and 5-year Federal budgetary impacts. To insure consistency in method across option bundles, the EPC established a common set of economic assumptions and provided oversight of all analytical work.

QUESTIONS FROM SENATOR WIRTH

Q. 3. Please provide an estimate of the cost of energy that would be produced or conserved for each of the options presented in the NES Interim Report (or, if this is not available for all the options in the Interim Report, please provide such estimates for each of the options DOE presented to the President), and the total for those selected and those rejected.

A. The NES Interim Report was a compendium of sometimes contradictory comments intended to lay out the broadest possible range of publicly perceived energy issues. Each option in this compendium was not modeled for estimates of energy costs. While National Energy Strategy (NES) modeling capability permits analysis of the effects of discrete policy options, such estimates tend to be misleading when not integrated with all other options that interact within a model. In other words, modeling one option while holding all other things equal can give a misleading impression of the effects of the option in the real dynamic world.

Accordingly, estimates of costs of energy produced or consumed are available only in the form of integrated results for either the Current Policy Base case, or the NES. The results can be distributed across end-use sectors, and fuel-types, but not across options.

The NES approach was to analyze complete "bundles" of options, in which various options were forced to compete, and from which emerged a full spectrum of energy, environmental and macroeconomic effects.
Energy costs to consumers, for example, declined under the NES scenario. Analysis results show that compared to the Current Policy Base case, crude oil prices decline by about $1.70 (in 1989 dollars) per barrel in 2000, and by over

$4.50 per barrel in 2010. GNP impacts of the bundle of actions comprising the National Energy Strategy were estimated using the EIA-DRI macroeconomic simulation model. Real GNP (in 1989 dollars) was projected to be about $25 billion higher by 2010 than without the National Energy Strategy actions.

Although cost data on the NES Interim Report compendium of options are not available, the Department of Energy is prepared to analyze options within selected scenarios of particular interest to the Committee.

QUESTION FROM SENATOR WIRTH

Q. 4. Please provide an estimate of the energy savings/domestic energy production and oil savings/domestic oil production DOE calculated for each of the options in the NES Interim Report (or, if this is not available for all the options in the NES Interim report, please provide such estimates for each of the options DOE presented to the President.)

A. The National Energy Strategy evaluated policy options using an integrated analysis approach. While we did use a series of estimates of energy savings/domestic energy production for each individual policy option to compare alternatives, we found that an approach evaluating options in isolation could yield misleading results. Competition between energy technologies, changing market conditions and synergistic effects could be missed. An iterative process of analyzing "bundles" or combinations of options, under different GNP growth and world energy market scenarios, as well as consideration of pros and cons of individual options, was used to develop the set of National Energy Strategy actions.

Based on our integrated analysis, National Energy Strategy actions are expected to decrease U.S. oil consumption in 2000 by 1.3 million barrels per day below a level predicted in the Current Policy Base case. In 2010, about 3.4 million barrels are expected to be saved. At the same time, Strategy actions could increase domestic oil production by 1.8 million barrels per day above base levels projected for the year 2000.

By 2010 domestic oil production could be augmented by 3.8 million barrels per day.

QUESTIONS FROM SENATOR WIRTH

ANWR Production

Question 6: **What percentage of the domestic oil production increases shown as attributable to the National Energy Strategy is contributed by projected oil production from the Arctic National Wildlife Refuge?**

Answer: DOE has estimated that National Energy Strategy measures would increase domestic oil production by 1.8 million barrels of oil per day above the levels projected for the year 2000. ANWR production would be in its initial stages of production by that year, and would account for 11% of the 1.8 million barrel per day increase. Production levels would rise to 22% of total production increases by the year 2005. In the later stages (2010 and later) of ANWR's development, production would, as in all fields, begin to decline.

ANWR production estimates in the NES are based on the mean economically recoverable resource estimate, which is 3.6 billion barrels of oil. Studies by the Department of the Interior, however, indicate that a wide range of oil accumulations could exist, extending to as much as 8.8 billion barrels of oil.

Questions from Senator Wirth

Question 9: In tabulating projected results of efficiency labeling initiatives, what percentage of consumer conformance with economic cost-effectiveness did you assume?

Answer: [Identical to the response to Question 4 from Senator Johnston]

In general, DOE does not assume that product labeling or other information-based initiatives will result in changes in consumer behavior that can be easily predicted or measured. We also do not assume that such initiatives result in the implementation of all cost-effective efficiency improvements, although there is evidence that such initiatives can result in savings that significantly exceed the costs of providing the information. The use of labeling, rather than mandatory standards, acknowledges the fact that consumers often have other decision criteria besides cost. The presence of labels, however, tends to heighten consumer awareness of energy costs as on important decision factor.

With respect to the proposal to require the efficiency labeling of equipment used primarily in the commercial sector, the quantitative analysis of the NES makes no specific assumptions about the energy savings likely to result.

In the **residential sector**, there is some anecdotal evidence that energy labels increase consumer awareness of energy costs, and thus may make it easier for manufacturers to introduce new, energy-efficient product lines in advance of efficiency standards. The Federal labels (and the DOE testing program that underlies both labels and standards) have also provided the technical "yardstick" used by a large number of utility rebate programs to encourage purchase of energy-efficient models.

In the **commercial sector**, some voluntary industry programs already exist for testing and labeling of motors and certain other equipment, but DOE is not aware of any evaluation of their effects. It seems reasonable to assume, however, that businesses will include some consideration of life-cycle costs in their purchasing decisions. Specific testing provisions for each major equipment category, the range of efficiencies currently on the market, and the degree to which test data are made available to and used by different types of purchasers, will be assessed in detail as an early step in implementing this NES option.

It is expected that efficiency testing and labeling will have more impact on certain commercial/institutional markets than in the residential sector, because of the greater cost-consciousness of the energy managers, procurement specialists, and other professionals in this sector. The impact of testing and labeling may also be increased to the extent that this market information permits or stimulates other measures, such as utility rebates and other incentives, tighter Federal procurement criteria or improvements in the equipment efficiency requirements of state and local building codes. However, where energy costs are small compared with other business costs, the impacts of information-only strategies such as labeling will be limited by the same constraints found in the residential sector. At the same time, when the amount of energy use affected is small, a Federal efficiency program may not be needed or appropriate.

There are other NES initiatives that are intended to encourage energy conservation by providing energy users with more complete and reliable information on the opportunities for improving energy efficiency, including elements of the proposal to expand the use of mortgage financing incentives for residential energy efficiency, the proposal to expand and develop energy audits for industry and DOE's efforts to improve consumer information on fuel economy and system efficiency.

In general, the NES makes no assumptions regarding the energy savings that will result from these initiatives or assumes that their impact is likely to be limited. For example, DOE's analysis of the proposal to expand the use of mortgage financing incentives for residential energy efficiency assumed that the widespread availability of such mortgage incentives and the necessary information on home energy efficiency might help improve the efficiency of 20-25% of the single family homes sold each year. But even for these homes it is not assumed that information alone would result in the implementation of all cost-effective efficiency improvements. Cost-effectiveness does not necessarily equate to consumer affordability or desirability, and it is not DOE policy to force undesirable features or practices on homeowners, nor to raise the cost of home ownership, which is already a serious problem for many Americans.

Questions from Senator Wirth

Question 10:	In your testimony, you stated that DOE calculations showed that petroleum savings attributable to a 40 M.P.G. CAFE standard would be approximately 500,000 barrels/day early in the next decade, a considerable difference from the 2.8 million barrels/day claimed by Senator Bryan. Please provide us with the detailed calculations of your figure, and a detailed comparison of its assumptions with those used to support the higher estimate.
Answer:	The Department of Energy's estimate of the fuel savings that would result from the CAFE standards proposed in the Senator Bryan's bill is about 1 million barrels per day by 2010 and about half that amount (the 500,000 barrels/day referred to in Secretary Watkins' testimony) early in the decade.

The detailed analysis supporting the 2.8 million b/d estimated savings and the feasibility of the Bryan bill has not been made public. On the basis of information that is available, we do not believe that the CAFE standards proposed in (S.279) are achievable from the standpoint of technology, cost and economic practicability. If they were, we believe that the major differences in oil consumption savings between the DOE and the Bryan estimates are as follows:

1. The NES base case assumes that fuel economy will rise, even in the absence of new standards, to about 33 mpg for cars and 24 mpg for light trucks by 2001. Senator Bryan's calculations apparently assume that fuel economy would remain static at 1988 levels of about 28.5 mpg for cars and about

21 mpg for light trucks. This factor alone accounts for about 50% of the difference in the two estimates of potential oil savings.

2. Our analysis assumes that given the momentum created by the 1990 Clean Air Act Amendments and by State programs, manufacturers will take advantage of the CAFE credits (now limited to approximately 1 mpg) for producing alternative fuel compatible vehicles. This produces another 5% to 10% (cars and light trucks) difference in the results.

3. Our analysis accounts for the tendency of more efficient cars to be driven more (the "rebound" effect). In this case we have assumed a -.2 elasticity of demand for travel with respect to vehicle fuel consumption. That is, for each 10% increase in fuel economy, the vehicle is driven 2% more than would otherwise be the case. This produces another approximate 10% difference in the results.

4. Finally, we understand that the 2.8 mm B/D figure is based on an estimate of about 25% higher overall fleet vehicle miles of travel (VMT) than we used in our calculations. This accounts for another approximate 10% of the difference.

Taken together these assumptions produce DOE savings estimates that are about 30% of those estimated for the Bryan bill and account for the difference between our figure of about 1 mmB/D by 2010 and about half that amount early in the decade and the Bryan estimate of 2.8 mmB/D.

Questions from Senator Wirth

Question 11: Has DOE calculated how much overall fuel economy of new cars will be reduced by the removal of the cap on CAFE credits for flexible-fuel vehicles under the Rockefeller-Sharp alternative fuels legislation? If there is no effect on fuel economy, wouldn't that mean that the credits (and removing the cap) would in fact have no economic value to manufacturers?

Answer: As indicated in the answer to Question 10, we believe that manufacturers will continue to face higher fuel economy requirements and will take advantage of allowable CAFE credits for alternative fuel capable vehicles. It is difficult to project how actual new vehicle fuel economy would be affected if the cap is removed. This would depend on the number of alternative-fuel capable vehicles built which, in turn, would depend on:

- The fuel economy regulatory and market pressure being faced by a manufacturer;
- the cost of producing alternative fuel capable vehicles relative to the cost of other fuel economy improvements;
- the level of consumer demand for alternative fuel capable vehicles, including the mandate to increase the alternative fuel capability of public and private fleets;
- the state of alternative fuel vehicle technology and the technology that consumers will choose; and

- the likely consumer demand for increased fuel efficiency, and the size and mix of the future new car fleet.

QUESTIONS FROM SENATOR BINGAMAN

Q. 1. The objectives of the National Energy Strategy as expressed in the document are highly commendable. The document goes further to discuss goals with respect to achieving greater energy security, energy efficiency, enhancing environmental quality, etc. Unfortunately, the goals are not specific enough to provide a clear understanding of what this strategy is trying to achieve. The document is full of projections of where we expect to be and appears to be more wishful thinking than a commitment to reaching specific levels of efficiency, reduction of oil imports, and so forth. Without specific targets, the plan is without direction. Shouldn't the goals be determined first and then the "roadmap" drawn up?

A. The establishment of specific Federal targets for energy imports or efficiencies is inconsistent with our economy's reliance on market mechanisms for directing the millions of consumer decisions which lie behind our energy supply and demand statistics. Much has been learned by the U.S. since the 1973-1981 era of import targets, well-head price controls and specific petroleum allocation and price targets. These policies unequivocally resulted in higher prices, greater dependence and less domestic production. We do not support reinstituting those failed command and control policies.

The NES is aimed at broad objectives--enhancing energy security, reducing vulnerability to oil market disruptions, improving the environment, and supporting economic growth--and it provides a specific set of initiatives to achieve the maximum feasible progress toward meeting those objectives.

QUESTIONS FROM SENATOR BINGAMAN

Q. 2. The Document makes it clear that the President is committed to relying on market forces to determine our energy policy. His policy mirrors that of his predecessor's administration. It is instructive to look at the results of that policy with respect to oil. In the early 1980's, this country imported 30 percent of its oil. When this administration took office in 1988, the percentage was up to 35. Today it is close to 50 percent. How is it that market forces alone will change this trend?

A. The market-oriented policies of the past decade have reduced the cost of crude oil to U.S. consumers and industry by 57 percent (in real dollars) from 1980 to the present. The United States derives considerable economic benefit from unencumbered trade in oil. Import levels per se, do not represent a security threat, and we may only be hurting ourselves if we adopt uneconomic policies designed to reduce import.

Market forces alone are unlikely to change the trend in imports. The National Energy Strategy contains a broad range of initiatives that work with market forces to: (1) develop alternative transportation fuels and technologies; (2) develop and use better oil recovery technologies; (3) reform regulations and statutes to allow us to take full advantage of our domestic natural gas resources; and (4) stimulate conservation of oil by using more efficient technologies and transportation modes. The NES explicitly rejected the idea that we should set some particular goal for imports and make achievement of that goal and end in itself.

The issue is rather one of economic vulnerability to potential disruptions in the oil market. This vulnerability can be best addressed through measures defined in the NES, which include: reduced oil use through fuel and technology diversification and improved efficiency; increased domestic production; expansion of world wide production capacity; and increased strategic stocks.

Questions from Senator Bingaman

Question 3: The proposals for conversion of various fleets to alternative fuel vehicles raise many questions.

(a) The conversion of the fleets of 10 vehicles or more in the 22 urban areas cited in the Clean Air Act are to be 10% and 90% in the years 1995 and 2000, respectively. Do these same percentages apply to the fleets of 20 vehicles or more outside those urban areas? What is the actual number of vehicles represented by these two groups? What percentage of the total U.S. light vehicles?

(b) Has consideration been given to including rental vehicles as fleets? Would there be incentives for these companies to convert?

(c) Conversion of the bus fleet is to begin in 2000. What is the replacement schedule in terms of % and dates?

(d) For the federal fleet conversion, how many of the new vehicles will be alternative-fuel vehicles and in what timeframe? The same as in (a)? Will military as well as civilian vehicles be included? If not, why?

(e) In the projections for the future especially dealing with emissions, what assumptions are made about conversions relative to kinds of alternative fuels - what percent will be natural gas, what percent biofuels, and so forth? In the year 1995? 2010?

(f) What measures will be undertaken to enlist the cooperation of the States to convert their vehicles?

Answer: (a) The same percentages apply to fleets of 20 or more in other urban areas with populations of 250,000 or more. The requirements do not apply outside these urban areas. We estimate that in 2005 about 5 million vehicles or less than 3% of the total U.S. vehicle population would be covered by these provisions. This is not a large percentage of total vehicles, but it will serve to begin the process of building the necessary alternative fuels infrastructure.

(b) Daily rental vehicles are excluded from the program. There are no specific incentives proposed for such fleets to purchase alternative fuel vehicles, although this is certainly a possibility that could be considered.

(c) The proposed schedule for alternative fuel buses is as follows:
in 2000, 50 percent of new purchases,
in 2001, 75 percent of new purchases,
in 2002, 80 percent of new purchases,
in 2003 and thereafter, 90 percent of new purchases.

(d) We would expect that the Federal vehicle fleet would shift to alternative fuels on a faster schedule, depending on the availability of alternative fuel vehicles that meet the needs of the vehicle users. Federal fleet use of alternative fuels would not necessarily be restricted to metropolitan areas.

(e) The relative market share of different fuels will depend on the vehicle technology available at any given point in time and on the cost and availability of the fuels. We estimate that initially natural gas and methanol are likely to split a majority of the fleet market. Electricity, and biofuels are likely to become prominent in later years if the expected results of the NES R&D

program are achieved.

(f) Under the NES legislation, State government fleets will be subject to the same requirements as private fleets. In addition, we are working with the General Services Administration to develop a program to assist the States in coordinating the procurement of alternative fuel vehicles.

QUESTIONS FROM SENATOR FOWLER

Renewable and Conservation Technologies

Question 1: Mr. Secretary, you will recall that back in 1988, I authored legislation which basically reestablished and strengthened our Nation's research, development and demonstration priorities in the area of renewable energy and conservation technologies. With the support of my colleagues on this committee, the bill was signed into law by the President in 1989 (P.L. 101-218).

The goals and purposes set out in this statute are clear. It called on you, Mr. Secretary, to "aggressively" pursue a national program for these technologies to ensure a stable and secure future energy supply. We gave you many tools to accomplish this and even provided latitude for administrative adjustments in some areas where we recognized the need for flexibility.

I am encourage by many aspects of your plan but it seems to me that in adopting this legislation, Congress already provided the blueprint for R&D and commercialization in this area.

Leaving aside, for the moment, the National Energy Strategy released yesterday, would you outline for us what steps DOE has taken since the law was enacted back in 1989, to advance these goals?

Answer: DOE has set realistic multi-year goals and objectives for each of the technologies mentioned in Public Law 101-218 and has pursued an aggressive national research and development program for each of them. Several renewable technologies are on the verge of successful commercialization into the mainstream energy marketplace. Their commercialization does not require scientific breakthroughs. What is needed is the opportunity to translate R&D progress to practice, removal of market barriers to renewables, and continued, focused R&D to realize the full potential of these technologies.

DOE R&D funding reflects our intention to bring renewables to commercial reality. For example, our 1992 request for photovoltaics ($50,800,000) is 9.7 percent higher than the appropriated amount in 1991 and 48 percent above the amount appropriated in FY 1990 when Public Law 101-218 was enacted. Our 1992 request for geothermal energy ($20,170,000) is approximately the same level as that authorized in Public Law 101-218 ($20,500,000) and is 17 percent higher than the amount appropriated in 1990, though less than the $28 million appropriated in 1991. In the energy efficiency area, our 1992 request of $101,910,000 for industry exceeds the 1991 appropriation by 22 percent and is 34 percent higher than the 1990 appropriation. For transportation, our 1992 request for $111,200,000 far exceeds the $71 million authorized in Public Law 101-218 and is 33 percent above the 1991 appropriation.

QUESTION FROM SENATOR FOWLER

Question 1(a):	As a specific follow-up to that and still in relation to this statute, I'd like to ask what initiatives DOE has adopted to improve the ability of the private sector to commercialize the proven technologies in this area?

Answer: In accordance with Public Law 101-218 and the National Competitiveness Technology Transfer Act of 1989, we rely heavily on collaborative projects with industry to increase the probability of technology transfer. In addition, we have restructured the Office of Conservation and Renewable Energy around an energy end-use orientation to allow easier understanding of and access to our research programs by industry.

A year ago, we introduced a series of initiatives, including a manufacturing initiative in photovoltaics and a cooperative R&D program with the Department of Agriculture on the development of feedstocks for alcohol fuels. We are also moving forward on joint development projects with industry on advanced batteries for electric vehicles, advanced wind turbines, and industrial waste minimization, among others.

As you know, further ideas for acceleration of the commercialization process are delineated in the National Energy Strategy. The Department has developed new authorities for technology transfer at the National Laboratories through Cooperative Research and Development Agreements with industry. In addition, we have strengthened the efforts of the interagency Committee on Renewable Energy Commerce and Trade (CORECT) to assist the U.S. renewable energy industries to find and develop export markets for their goods and services and have planned new international market development thrusts for both renewable energy and energy efficiency industries.

QUESTIONS FROM SENATOR FOWLER

Renewable and Conservation Technologies

Question 2: Admiral Watkins, in your executive summary of your National Energy Strategy you say that we can accelerate growth in renewable supplies over the next 40 years without resorting to permanent subsidies or mandates. Obviously you have had the benefits of reviewing some long term assessment of the market potential and growth of these technologies. I applaud this approach. Yet I do not read your proposals in this area as focusing on this kind of long-term strategy.

Will you review for us how these proposals you have outlined in your strategy will take us into the decades of growth you are projecting as possible for our renewable energy supplies?

Answer: Research and development to improve performance and reduce costs will make renewable technologies more competitive in the mid to long term. The NES projections suggest that renewables' contribution to the Nation's energy supplies will increase from 6.8 quads in 1990 to about 22.3 quads in 2030, and will provide approximately 18% of all U.S. energy consumption in the latter year.

During this 40-year period we expect the cost of energy from renewables to be reduced significantly. For example, using levelized costs, the cost of electricity from photovoltaics is expected to decline from 30 cents per kilowatt-hour to 5 cents, solar thermal from 12 cents per kilowatt-hour to 6 cents, wind power from 9 cents per kilowatt-hour to below 4 cents, and ethanol from $22 per million Btu to $8.

Removing regulatory barriers through such options as streamliining hydropower regulations, modifying the Public Utility Holding Company Act and the Public Utility Regulatory Policies Act, supporting the use of integrated resource planning and full fuel cycle analysis in the decisionmaking process, and improved transmission access will allow renewables to compete more effectively in the near term. The use of emerging renewable technologies in the near term will improve competitiveness in the longer term by creating an experience base for these emerging technologies.

QUESTIONS FROM SENATOR FOWLER

Renewable and Conservation Technologies

Question 3: Your discussion of renewables and energy efficiency commercialization is limited to domestic markets, is that correct?

That is troubling to me because I have seen quite a bit of America's ingenuity lost to foreign countries due to our government's lack of foresight. We lost our world market lead in photovoltaics to the Japanese, in wind to the Dutch.

I commend Chairman Johnston and Senator Wallop for their wisdom in including an international market perspective in the legislation they recently introduced.

My question is while we are undertaking this expansive and comprehensive policy review, would it not be wise to look at how we can integrate these technologies into the international marketplace? Shouldn't we, like other countries, do what we can to help our domestic industry explore world markets?

Answer: The NES encourages increased public and private collaboration and support for U.S. energy and energy-related products and services to ensure that these technologies meet the world's energy, economic, and environmental needs. More than 10 Federal agencies are involved in providing support for the export of U.S. products and technologies. The President has instructed the Economic Policy Council to improve the coordination and cooperation of these agencies in pursuing opportunities to improve the competitiveness of U.S. products in international markets.

The Department of Energy supports four key initiatives in energy export promotion. These include (1) the Eastern European Initiative which is developing a data base on energy use in Eastern European countries and is providing technical assistance to those countries, (2) the Energy Export Assistance Office which is providing assistance to U.S. energy industries in exporting energy and energy-related technologies and services, (3) the Clean Coal Technology Export Program which is involved in efforts with the U.S. Agency for International Development and the Trade and Development Program to fund feasibility studies on energy-related trade opportunities, and (4) the Committee on Renewable Energy Commerce and Trade (CORECT) which is involved in efforts to provide information on the practical value of renewable energy technologies and to facilitate U.S. industrial efforts in adapting proven renewable energy technologies to international markets.

Follow-up: As you know, the Committee on Renewable Energy and Trade (CORECT) has been an important Federal interagency effort to promote renewable energy exports. Do you believe these efforts are adequate to meet the growing international competition in world markets?

Answer: Yes, I do, assuming funding levels as requested in the budget. CORECT was established by the Department of Energy to help U.S. renewable industries compete in the international marketplace. CORECT will assist U.S. renewable industries in finding and developing export markets.

QUESTION FROM SENATOR FOWLER

Q. 4. "What specific education initiatives do you have in mind here?" [i.e., "support for increased participation of all population groups, including women, minorities, and the disabled, in science and technology careers."]

A. The Department of Energy has several programs designed to draw underrepresented groups into energy-related careers. Numerous other agencies have similar programs. A complete listing and explanation of these programs may be found in the report of the Federal Coordinating Committee on Science, Engineering and Technology (FCCSET) Committee on Education and Human Resources, *By the Year 2000*. Some elements of these programs are highlighted below.

The programs include math and science education programs aimed at keeping K-12 youths in the math and science pipeline. Three relatively new precollege initiatives, begun in FY 1990 or FY 1991, provide good examples: OPTIONS in the Pacific Northwest, SMART in Tennessee, and a Native American Initiative in New Mexico.

- Pacific Northwest Laboratory's (PNL) OPTIONS program connects middle school teachers and students with PNL scientists to stimulate interest in science and engineering careers. The focus of OPTIONS is on schools with high percentages of minority students (Hispanic, Native, or black American) located in the Yakima Valley, Seattle, and Spokane in Washington state and in Portland, Oregon.

- The Science and Mathematics Action for Revitalized Teaching or SMART program is a project of Oak Ridge National Laboratory (ORNL) and Oak Ridge Associated Universities (ORAU). Scientists and staff from ORNL and ORAU, in partnership with local business and industry, work closely with teachers and administrators in three school districts in Chattanooga and Roane Counties, locales with high percentages of minority and rural students respectively.

- The Native American Initiative in New Mexico is carried out through the cooperation of Sandia and Los Alamos National Laboratories. These labs have adopted every Bureau of Indian Affairs middle school and every Indian Nation middle school in New Mexico and northern Arizona.

- At the undergraduate and graduate levels, the Department contributes to programs designed to encourage specific groups to increase their participation in energy-related fields and careers. Support is also provided for this purpose to Historically Black Colleges and Universities (HBCUs) and other minority institutions. Again, a more complete inventory of programs is to be found in *By the Year 2000*.

QUESTIONS FROM SENATOR FOWLER

Electricity Conservation

Question 5: Admiral Watkins, having only received a copy of your plan late yesterday I admit that I haven't had an opportunity to study the initiatives you're proposing for energy conservation as carefully as I intend to. But it seems to me that we need to examine the fundamental assumptions we are making in this area before we move forward in examining your plans for increasing efficiency in electricity generation and use. I would think that in pursuing your stated aim to "produce, distribute, and consume electricity as efficiently and as cleanly as possible" this goal would be better served by pursuing a policy that provides incentives to utilities where plants are not constructed due to energy conservation measures that they have undertaken. When approached from that perspective, the conservation proposals before us today seem like an afterthought.

Establishing such a policy, it seems to me, would have several benefits: it would produce enhanced earnings to the utility, consumer utility bills would be lowered overall, and it would permit savings of additional energy investments that would have gone into refining certain raw materials and into manufacturing processes which would have been required to build an unnecessary generating facility.

I am not suggesting that we can meet all of our future capacity needs for electricity through increasing energy efficiency. But I am curious as to why DOE "backed into" conservation in the way that you did here.

Answer: I assure you that the Department of Energy did not "back into" the NES proposals relating to electricity conservation measures. These measures have been an integral part of the NES analysis process from the start.

DOE analyses indicate that State regulatory authorities are increasingly utilizing demand reduction approaches to assure efficient energy services to consumers. The Federal-State partnership in this area will be substantially strengthened by measures provided in the NES. These include an expansion of DOE's already successful support of State Integrated Resource Planning (IRP) processes. The budget for this program will increase to $5.0 million in FY 1992 from $2.9 million in FY 1991. The DOE program can help utilities to evaluate the most cost-effective means to avoid building new generating plants, as you suggested in your question.

Other IRP initiatives proposed in the NES include utilizing the Federal Power Marketing Administrations to promote conservation activities by their customer utilities, fostering Federal Energy Regulatory Commission consideration of IRP in its wholesale ratemaking authority, supporting Federal tax exemption of utility rate discounts, and increasing support for research, development, and demonstration programs for energy conservation technologies. The industrial and buildings efficiency R&D budget for FY 1992 calls for expenditures of $157 million, a 22% increase over

FY 1991. We estimate that the combined result of the conservation initiatives proposed in the NES will reduce electricity consumption by about 7 percent by 2010, and by about 12 percent by 2030.

QUESTIONS FROM SENATOR FOWLER

Solar and Renewable Resources

Question 6: Your proposal outlines specific regulatory reforms to promote the hydro-power and nuclear power industries. Why has this same approach not been taken to remove regulatory barriers for solar and renewable sources?

Answer: We have taken the very same approach for solar and renewables, which include hydropower, and have gone one step further by supporting an extension of the 10 percent investment tax credit for solar and geothermal projects. Reform of PURPA, as proposed in the NES, will eliminate the size cap and cofiring limits for renewable technologies. The analysis of fuel cycle costs, a major multi-year project being undertaken by the Department of Energy in collaboration with the European Community and Japan, will further assist the appropriate consideration of renewable energy sources for generation of electricity. Finally, the increases in the DOE renewable energy budget will accelerate the commercialization of solar and other technologies.

QUESTIONS FROM SENATOR FOWLER

Solar Hot Water

Question 7: My final question involves your budget request to the Congress in the area of solar buildings technology, specifically solar water heating. Buildings now consume about 35 percent of this Nation's energy production and solar water heating now displaces 1,000 megawatts nationally in 1.2 million buildings.

Why have you slated this technology for cuts in your budget proposal?

Answer: A major thrust of the solar space conditioning and water heating program over the last several years has been to develop, in conjunction with industry, test procedures and energy efficiency rating and labeling methods for generic types of solar domestic hot water (DHW) heaters. The purpose of this work is to provide a means for consumer evaluation and comparison of solar water heating systems in the same manner as conventional water heaters. This work consists of laboratory and field testing, computer model development and validation, rating and labeling methods development. The results will be promulgated through the Solar Rating and Certification Council, an industry trade group which is actively participating in the project.

Completion of the generic DHW rating methods project will remove a major technical/

institutional barrier to the utilization of solar DHW systems. The majority of technical work on the generic DHW rating methods project will be completed in FY 1991, with the result that significantly less funds are needed in FY 1992.

Funds will be needed in FY 1992 primarily for continuation of 1991 efforts in research and development of advanced systems, including advanced, low cost collectors, novel space heating and advanced DHW systems, and controls.

QUESTIONS FROM SENATOR NICKLES

PUHCA Amendment

Question 1: The NES proposes to amend the Public Utility Holding Company Act (PUHCA) to allegedly remove impediments to greater competition. One concern that has been brought to my attention is that such an amendment may negatively impact on the reliability of electric service. Are Independent Power Producers necessary to avoid power supply shortages? Would you please provide this Committee with a copy of the Administration's study of this supply issue.

Answer: Amendment of PUHCA should enhance reliability of electric service, not detract from it. As it now stands, PUHCA prevents many of the most capable, reliable electricity suppliers from entering into wholesale power markets. If this barrier is removed and appropriate measures to protect consumers are retained, the cost of new power supplies can be reduced while maintaining, or even enhancing, reliability of service.

We do not believe Independent Power Producers, or any other particular kind of power producers, are "necessary to avoid power supply shortages." We do believe consumers are benefitting from the greater competition provided by independent power producers. Under the NES proposal, decisions of whether (or to what extent) to obtain new supplies through competitive procurement will continue to be the responsibility of utilities and their State regulators--just as they are today. Some utilities already have extensive power purchase programs in place. Adverse impacts upon reliability are avoided by screening prospective independent power projects for technical and economic soundness, and by limiting the utility's exposure to any one project, fuel source, or developer.

Our analysis of PUHCA reform is being edited for publication as a technical annex. This technical annex was provided to the Committee in conjunction with the March 14, 1991 testimony of Linda Stuntz on PUHCA reform.

QUESTIONS FROM SENATOR NICKLES

PUHCA Amendment

Question 2:	**It is generally presumed that developers of independent power producer units will use highly leveraged debt financing, perhaps exceeding 90%. Do you agree with that view and do you have a position on whether it is wise energy policy to invite such highly leveraged debt into the national electrical system? What are the pros and cons of the leveraged financing from an energy supply and reliability policy perspective? Does allowing such highly leveraged debt create too great an incentive for IPP developers to "walk away" if their economics turn bad?**
Answer:	Amending PUHCA does not affect the financing of new generating units. Utilities would not be required to purchase new electricity supplies from others unless their State regulators institute a competitive acquisition program. If they do, purchasing utilities, under the guidance of their State regulators, will develop procurement contracts that can specify limits on the use of debt in new generating units. The contracts would determine what happens if the IPP tries to "walk away." Many current contracts provide that the utility can take over the project in this case.

The core issue here is allocation of risk. Relatively low-risk projects, such as we have seen under PURPA rules, can be financed affordably on a low equity-to-debt ratio. Continued use of such a low ratio outside the PURPA rules may well prove infeasible if more risk is placed on the IPP and its associates in the procurement contract between the utility and the IPP. It should be noted, however, that a unit with a high debt ratio has a strong incentive to maintain reliable operations to service that debt load. This is one reason why many IPPs operate at extremely high capacity factors.

QUESTIONS FROM SENATOR NICKLES

Question: # 3	Why do you want to place FERC within DOE? Is it prudent management to try and reorganize at the same time you are putting in place major new initiatives?
Answer:	The reorganization of FERC into a single-headed executive agency within DOE is consistent with, and in fact complements, the Administration's major new initiatives to reform and streamline the regulatory infrastructure that obstructs the efficient use of our domestic natural gas and hydroelectric resources.

The regulatory reform of the natural gas industry would eliminate the requirement for virtually every decision made between a pipeline and its customers or shippers, as well as the investment or lending decisions of its financiers, to be approved (or initially established) by the regulators. Once these statutory inhibitions are removed, the necessity for protracted multi-party adjudicative hearings will be reduced significantly. The natural progression from wellhead deregulation of producers to emphasis upon competitive, rather than strict regulatory, forces on the remainder of the natural gas industry suggests that a simplification of the regulatory structure will enhance, rather than hinder, the implementation of these new initiatives.

Since the proposed regulatory reforms would encourage prompt and decisive action, a structure such as the proposed single-headed Natural Gas and Electricity Administration (NGEA) is more consistent with that approach than the procedural complexities which are abundant, for reasons of both legislation and tradition, in FERC. Multi-headed independent agencies which are prohibited from discussing ongoing proceedings with either Congress or the executive branch, or from debating and deciding those issues other than in a formal public setting, cannot be expected to act as responsively or expeditiously as an administrator who is subject to Congressional oversight and executive branch coordination of his policies. The existing procedural deficiencies of FERC, in which policy is frequently established in complex adjudicative hearings determining the fate of an individual company (rather than the industry on a generic basis) and then appealed upward to the Commissioners, could be substantially remedied by the proposed NGEA in which policy would be formulated at the top levels and then implemented, generically, in individual proceedings, subject to the facts as independently determined by an administrative law judge.

QUESTIONS FROM SENATOR HATFIELD

Solar and Renewable Energy

Question 1: Both the FY 92 budget and the National Energy Strategy show a commitment to minor increases in funding for solar and renewable energy. What ideas and programs does DOE propose to attract capital for actual project development of renewable energy nationwide?

Answer: Renewable energy projects will attract capital when they can effectively compete in the marketplace with other energy resources and provide a profitable return on investments. The objective of the NES program for renewable R&D is to accelerate the timing of commercialization by reducing cost. The NES will accomplish this by relying on technological improvement rather than long-term subsidy. While the FY 1992 budget request calls for only a minor increase in solar and renewable energy, it is consistent with the NES and sharply focuses research and development in areas that provide the greatest potential contributions to energy supply. Key renewable energy areas include photovoltaics, wind, and biofuels, where increases are requested of 10, 26, and 11 percent respectively, relative to FY 1991 funding.

The NES also proposes several non-R&D actions to help attract capital to renewables in the near term, however. For example, streamlining hydro regulation will reverse the current situation which discourages hydropower investment. Our proposed changes in PURPA would help larger and more economical renewable projects to qualify for PURPA's advantages. And our proposed extension of the 10% investment tax credit for solar and geothermal is intended to attract capital specifically to these technologies.

QUESTION FROM SENATOR HATFIELD

Question 2: The law P.L. 101-218 requires DOE to establish an advisory committee on joint ventures and develop a program based on input of that advisory committee. I understand this committee has yet to be appointed. When does DOE intend to appoint this committee and, more importantly, institute an aggressive joint venture program?

Answer: The charter for the committee has been approved, and membership is close to being finalized. We plan to hold the first meeting of the joint ventures advisory committee in May of this year. We have done background research on information which will be useful to the committee's deliberations, and will seek its advice on joint venture arrangements, as well as other commercialization options to be reported to the Congress. In September 1990, we solicited and received over 200 "expressions of interest" in the joint ventures program from industry, universities, and state and local governments. As soon as the advisory committee has helped us define the best structure and approach to these innovative joint ventures, we look forward to pursuing a vigorous government/industry/academia cooperative program to help the U.S. maintain and strengthen its competitive edge in renewable energy and energy efficiency.

QUESTIONS FROM SENATOR HATFIELD

Solar and Renewable Energy

Question 3: On page 119 of the NES, there is a reference to extending the 10% investment tax credit for solar and geothermal to certain wind and biomass technologies.

To which specific wind and biomass technologies are you referring?

Answer: The reference to wind and biomass technologies in the table on page 119 of the NES is an editing error. As discussed in the text on page 126 of the NES, the Administration supports an extension of the investment tax credit for solar and geothermal projects.

QUESTIONS FROM SENATOR MURKOWSKI

Question 1: Is the Administration in support of opening the coastal plain of ANWR?

Answer 1: Yes, we strongly support environmentally responsible exploration and development of portions of the coastal plain of the Alaska National Wildlife Refuge.

There is a 46% chance that economically recoverable oil will be found, and, if so, then the mean estimate of the amount of recoverable oil is 3.6 billion barrels with a 5% chance of finding at least 8.8 billion barrels. Only two states outside Alaska -- Texas and California -- have proved oil reserves that exceed 3.6 billion barrels. No state, including Alaska, has proved reserves that exceed the 8.8 billion barrels that may be within ANWR. The 8.8 billion barrel potential is greater than the combined proved reserves of 28 of the nation's 31 oil producing

QUESTIONS FROM SENATOR MURKOWSKI

Question 2:	Is the purpose of including the opening of ANWR to provide domestic oil production to offset declining U.S. production or to raise revenues for the U.S. Treasury?
Answer 2:	The development of ANWR resources would provide multiple benefits. The energy benefits are the primary mason for the proposal. The amounts of oil that could potentially be produced from ANWR would make a vital contribution to domestic production; would lead to significant national economic and security benefits by reducing reliance by ourselves and our allies on insecure supplies of energy; and would have a positive economic effect on current North Slope production and on the Alaska pipeline system. The potential Federal and State revenues from ANWR development would also be substantial.

QUESTIONS FROM SENATOR MURKOWSKI

Elk Hills Revenue Sharing

Question 3: The National Energy Strategy specifies that Elk Hills Naval Petroleum Reserve revenues would be shared with the State of California on a 50/50 basis. How did DOE arrive at that split? Was 50/50 specified in California statehood legislation?

Answer: The National Energy Strategy proposes that 50% of lease royalty payments and 7% of lease bonus payments from the leasing of the Elk Hills Reserve would be paid to the State of California. These participation provisions were not derived from California statehood legislation. They are contained in H.R. 701, a bill sponsored by Congressmen Thomas and Lagomarsino that would authorize the leasing of Elk Hills. The 50/50 lease royalty split is the same Federal/State split found in section 35 of the Mineral Leasing Act (30 U.S.C. 191) for the sharing of Federal royalties from public lands leased in the various States (except for Alaska, which receives 90% of the Federal revenues generated from mineral leasing on public lands in the State, but only 50% of the revenues generated by the National Petroleum Reserves (in Alaska) pursuant to 42 USC 6508). With regard to the lease bonus payment, the State of California agreed to limit its claim to 7% because it recognizes that the leasing proposal must be mutually beneficial to both the State and to the Federal Government if it is to go forward.

QUESTIONS FROM SENATOR MURKOWSKI

Natural Gas Imports

Question 4. The NES proposes to end DOE regulatory control of natural gas imports and exports. Are exports of natural gas consistent with the U.S. energy security requirements and the needs of domestic natural gas consumers?

Answer: Yes. One of the goals of the NES is to diversify energy sources and to increase the availability of secure energy supplies on the world market. This will promote greater competition with, and less demand for, oil supplies from less secure regions. Because world energy markets are interrelated, the increased availability of energy supplies on the world market will tend to lower the price of energy both worldwide and in the U.S. Conversely, withholding energy supplies from world markets makes the U.S. more vulnerable to oil supply disruptions.

Allowing U.S. natural gas to be exported increases U.S. production, expands trade opportunities, encourages the construction of new capacity, and enhances overall economic activity.

QUESTIONS FROM SENATOR MURKOWSKI

Hydropower Regulation

Question 5: I would like to compliment you on the 5 MW hydro exemption in the NES. My State of Alaska has great hydro potential and will benefit greatly from the proposed exemption from FERC review for small projects. These projects are very important in providing energy for small, scattered Alaska communities and resource development projects. Senators Johnston and Wallop's bill, S. 341, has a similar provision, but the exemption is only for 1.5 MW or smaller hydro plants. Alaska would benefit from the larger 5 MW exemption. Could you explain why you have recommended the 5 MW exemption over 1.5 MW?

Answer: The primary basis for giving FERC jurisdiction over a hydropower project is the project's potential effects on interstate commerce and navigation. The courts and FERC have interpreted this jurisdictional area very broadly so that any project, no matter how small, connected to an interstate transmission system or discharging into the ocean is considered jurisdictional.

However, hydropower projects of 5 MW or less have little or no impact on navigation or interstate commerce and thus need not be regulated by FERC. In Section 405 of PURPA, the Congress has already given the FERC discretion to exempt from certain licensing requirements projects of 5 MW or less that do not require construction of a dam. At present, FERC grants exemptions only on a case-by-case basis after an extensive regulatory review process. These small projects routinely involve only local and State issues and would be better regulated by the States, and by Federal land management agencies when located on Federal lands.

QUESTIONS FROM SENATOR MURKOWSKI

Exports of Alaskan Oil

Question 6. The NES proposes promotion and export of California heavy crude oil (25,000 bbl/day). Would DOE promotion of export of heavy crude oil also apply to Alaska's heavy crude oil?

Answer: The reasons for advocating export of California heavy oil (crude oil that is below 20 degrees API gravity) relate to unique market conditions in California that do not apply to Alaskan oil.

The California heavy oil market was the subject of a detailed interagency study led by the Department of Commerce. The study, which was submitted to Congress in August 1989, concluded that low prices for heavy crude in California have led to production shut-ins, particularly among independent producers.

Heavy crude supply in California exceeds the current California refining capacity to process it into light transportation fuels. Much of the crude is refined inefficiently and the heavy products (residual fuel and distillate) are exported by refiners. Small producers' crude oil marketing problems are complicated by the existence of only one major common-carrier pipeline. Independent producers lacking access to this pipeline are forced to sell directly to integrated firms at prices set by those refiners. Therefore, allowing heavy crude oil exports would help to rectify the disadvantage experienced by small independent producers that lack other market options.

Increased revenues for independent producers can lead to more exploration, development and subsequent production. The market characteristics that led DOE to advocate exports of California crude oil do not apply to Alaska, where little refining takes place.

We estimate that without an export market, California crude oil production will be substantially reduced or shut in.

QUESTIONS FROM SENATOR MURKOWSKI

Natural Gas Imports

Question 7. DOE has previously approved the export of natural gas from Alaska via the Yukon Pacific project. Are the considerations that led to the issuance of this export license the same as those behind the proposal to end regulatory control of export and import transactions?

Answer: The specific issues addressed in DOE's decision approving the Yukon Pacific export project were unique to that particular proceeding. However, as noted in the answer to question 4, free trade in natural gas improves economic prospects for all concerned, increases fuel competition, and reduces reliance on unstable suppliers.

QUESTIONS FROM SENATOR SEYMOUR

Effects of the Persian Gulf Crisis on Oil Supplies

Question 1. **What do you believe have been the most effective measures that the Department has taken in cooperation with the International Energy Agency to minimize the price distortions and supply disruptions resulting from the invasion of Kuwait?**

Answer: **Starting a few days after the invasion of Kuwait in August, and continuing throughout the crisis, Department officials conducted planning sessions with International Energy Agency (IEA) officials to assess the oil supply and price situation confronting IEA members. This planning was instrumental in ensuring that all members had compatible, current, and reliable information about supply and demand.**

The United States undertook a number of actions that contributed to a better understanding in both the United States and within IEA countries of how to deal with the crisis. First, it worked with its IEA allies in urging countries with excess capacity to produce more crude oil. The United States also conducted a series of emergency planning exercises to prepare for events that might develop in the Persian Gulf, and it advised IEA allies of the results. One of these included a test sale of 4 million barrels of SPR oil. In addition, the United States implemented a series of short and medium term response measures to reduce oil consumption. Close coordination with the U.S. Commodities Futures Trading Commission permitted Department officials to develop a good

understanding of events in the very important New York Mercantile Exchange oil futures market and in other oil markets.

Close coordination with our IEA allies was essential to the joint assessment that oil supply was adequate in the aftermath of the loss of Kuwaiti and Iraqi production to meet consuming nations' needs barring any further disruption of production in the Middle East or elsewhere. On the basis of this consensus, IEA countries correctly refrained from ill-conceived unilateral actions such as petroleum price controls and allocations that would have been disruptive to their own economies and to world oil markets.

On January 11, 1991, in anticipation of any possible temporary shortfall in oil supplies in the event of hostilities, IEA members, with the active participation of the United States, adopted a coordinated contingency plan to make additional petroleum supplies available to world markets. A drawdown of the SPR was authorized within hours of the launching of Operation Desert Storm on January 16, 1991, and a notice of sale was subsequently issued, which resulted in awarding of contracts for 17.3 million barrels of oil.

Questions from Senator Seymour

Research and Development Programs to Improve Business Competitiveness

Question: The future competitiveness of many American industries -- especially those dependent on export markets, consumer durables, and other mass production items -- can use new energy-saving methods to maintain skilled labor forces, reduce overhead, control per unit costs, and increase profitability. In this light, what plans does DOE have to begin programs in cooperation with colleges and universities for the development of advanced industrial production technologies?

Answer: DOE has been working with colleges and universities across the country on research to improve industrial process efficiency. For example, with DOE funding,:

- The Massachusetts Institute of Technology is evaluating inert anode materials for use in the production of aluminum;
- Purdue University is developing a sensor utilizing nuclear magnetic resonance to determine the ripeness and quality of fruit prior to marketing or processing;
- The University of Tennessee is developing an on-line realtime chemical composition scanning system for distillation systems; and
- Lehigh University will undertake a project to develop a sensor probe that will rapidly determine the chemical composition of molten iron and steel using spectroscopic analysis.
- The FY 1992 budget requests funding for 22 colleges and universities to operate Energy Analysis and Diagnostic Centers, which provide energy-use consulting to small- and medium-sized

businesses.

Most DOE-funded industrial R&D, however, is performed or managed by the industry that will use it. This means that the technology is automatically in the hands of the people who need it and therefore the need for after-the-fact technology transfer is minimized.

QUESTIONS FROM SENATOR SEYMOUR

Energy Technology Exports to Foreign Users by U.S. Firms

Question 3: You mention in the FY92 Posture Statement that the Department looks forward to helping energy technology companies export their products and know-how to legitimate users overseas. I strongly support this effort, but as you know, the Departments of State, Defense, and Commerce engaged in several paperwork wars during the 1980's that left the definition of many security-sensitive technologies ambiguous and many well-intentioned businesses losing money as they waited for the government to approve their export licenses. How do you forsee your Department's playing a constructive role in ensuring that legitimate companies can export their products to legitimate foreign buyers without compromising U.S. national security?

Answer: The Department of Energy has a well-defined role in support of the export control processes administered by the Departments of Commerce and State. DOE provides technical advice and participates in the approval process for a variety of export issues. These include issues related to nuclear energy, nuclear proliferation, dual (military and civilian) use technologies, and energy related technologies. The Department contributes to the identification of militarily critical technologies and the definition of a variety of export control parameters that are used in determining the national security significance/releasability of technology items. The Office of Classification and Technology Security Policy is the Department's focal point for direct participation in the export control process and in addressing specific national security concerns. Over the past several years there has been a beneficial relaxation of a number of controls such as those maintained by COCOM on a spectrum of technologies. This has been achieved without dilution of the controls related to proliferation, missiles/launchers, and chemical/biological warfare related technologies and commodities. The Department manages an expeditious license review process that encourages rapid resolution of most license requests.

Recently, the Department established the Office of Export Assistance which is an outreach activity to help U. S. companies take advantage of the recent liberialization of export controls as well as opportunities for new and difficult markets, such as Eastern Europe. The Office of Export Assistance provides an important perspective on U.S. competitiveness that helps DOE balance its responsibilities for promoting energy exports and protecting national security interests. This Office is already taking an active role, in concert with those responsible for export control, in evaluating whether a potential export opportunity would be appropriate. We believe these complementary and coordinated internal Departmental processes, export control and export promotion, are effective and will help ensure that legitimate companies can export their products to legitimate foreign buyers without compromising U.S. national security.

Finally, the Department has initiated an effective dialogue with potential U. S. exporters interested in marketing products and services outside the scope of current national security concerns. In cooperation with the Office of the U. S. Trade Representative, the Department of Commerce, and other agencies, the Department is evaluating the export potential of innovative technologies and products that address worldwide energy and environmental requirements. The Department is increasing its efforts to identify companies with export opportunities and to provide appropriate support both within the Department and within the Executive Branch.

QUESTIONS FROM SENATOR SEYMOUR

Fossil Energy Research and Development

Question: DOE's own figures show that within twenty to thirty years, U.S. dependence on foreign oil imports could approach seventy percent. Certain fossil energies, as you noted in your posture statement, could help us control this problem as well as reduce carbon dioxide emissions. What prompted the Department, then, to cut its Fossil Energy budget by more than fifty percent for the next fiscal year?

Answer: The National Energy Strategy is a multi-dimensional plan to address U.S. energy security policy. One year budget levels for a single DOE program office do not represent the totality of budgetary actions that translate NES objectives into implementable programs.

The FY 1992 budget request for Fossil Energy Research and Development is below the FY 1991 appropriation level but 12 percent above the FY 1991 request. The reduction from current levels includes focusing of the program on clean, high-efficiency coal technologies. While budget constraints have affected the FE R&D program, a significant government-wide increase is proposed in R&D specifically aimed at energy security. This R&D initiative is complemented by NES proposals to explore and develop the considerable resources that are deemed to be available in Alaska's ANWR and in the Outer Continental Shelf.

Questions from Senator Seymour

Federal Government Conservation Efforts

Question: The United States Government consumes more than 2 percent of the nation's total energy resources. You mention in your posture statement an initiative to improve the efficiency of lighting in federal buildings. Has DOE designed any other pilot programs for federal conservation in the transportation or heating/cooling sectors that could provide examples for the private sector?

Answer: In addition to the Federal relighting initiative, DOE is cooperating on projects with other Federal agencies that take advantage of utility demand-side management programs. Many utilities offer financial incentives to their customers for the installation of energy efficient heating and cooling systems. An Executive Order directing agencies to utilize these incentives, within each agency's existing authority, is expected to be issued shortly.

Additionally, during FY 1991 we have begun efforts to select one or more heating or cooling, cogeneration, or other advanced energy efficiency technologies for demonstration on Federal sites. We have requested sufficient funds for FY 1992 to demonstrate one such technology.

In the transportation sector, DOE has initiated several alternative fuel demonstration programs under the Alternative Motor Fuels Act of 1988. Data from the demonstration program will be collected and analyzed at a newly established alternative fuels data center. The data results, methodology, and the services of the data center will be available for all interested participants. DOE is also working with GSA to coordinate the purchase of alternative fuel vehicles with States.

DOE is also working cooperatively with the private sector and other, non-Federal institutions, to support the research, development and demonstration of a wide range of other new energy technologies.

Questions from Senator Seymour

Alternative Fuels

Question: Automobiles consume 60 percent of America's imported oil, and for this reason, DOE's alternative fuels program is critical to reducing our Nation's dependence on offshore petroleum sources. Of the $16 million that the Department has budgeted for alternative fuels development over the next fiscal year, what areas will receive the highest priority and why?

Answer: DOE has requested the appropriation of $45.9 million for alternative fuels-related R&D in FY 1992. The budget for biomass fuels R&D is $29.4 million, a 42% increase over the FY 1991 appropriation. This research is directed primarily at the development of technologies to produce ethanol from non-food crop biomass, such as wood and grasses. The FY 1992 budget request for alternative fuels utilization R&D is $16.5 million, a 17% increase over FY 1991.

Of the $16.5 million requested for alternative fuels utilization, the highest priority is the development of a data collection system that includes: (1) construction of a mobile heavy-duty emission test facility capable of testing trucks and buses on site, (2) creation of an Alternative Fuels Data Center for collection, analysis and dissemination of data, and (3) establishment of a common data collection protocol for fleet users. This data collection system is being given the highest priority to insure the demonstration program produces the maximum amount of reliable data.

The next priority is obtaining test units to serve in the demonstration programs. The effort emphasizes light duty vehicles, trucks, and buses in that order. The light duty vehicle is emphasized because of the high consumer visibility associated with automobiles and the large numbers of light duty vehicles in service.

Natural gas, methanol and ethanol demonstration programs are planned. New technologies will be emphasized as they become available, regardless of the fuels and vehicular application.

The highest priority is in meeting the statutory demonstration program requirements of the Alternative Motor Fuels Act followed by R & D aimed at improved engine efficiency and reduced emissions. The applied R & D emphasizes support of demonstration programs and research on hydrogen and reformulated fuels. Additional research involves effects of alternative fuels on ozone and atmospheric effects.

Questions from Senator Seymour

Waste Recycling

Question: Many states, including my own, now face a crisis of finding environmentally acceptable landfill locations. Yet waste conversion could represent one of the cheapest and convenient ways to develop alternative energy sources. What, in your opinion, have been the most promising waste reduction and conversion technologies discovered thus far?

Answer: The most significant waste conversion technology is the mass burning of waste to cogenerate electricity. It produces energy efficiently, and reduces landfill requirements by 90 percent.

Another important waste-related "technology" is recycling. For example, with the help of a major national advertising campaign by industry, 60 percent of the aluminum cans produced each year are being recycled.

Question: What regulatory impediments to waste reduction does DOE wish to eliminate?

Answer: In developing a waste minimization program, we have had numerous contacts with decision-makers in industry. Anecdotally, the problems appear to be significant. Evidently, there are cases where industry managers do not invest in energy-efficient, waste-minimizing new technologies because of concerns about being fined for not meeting regulations based on current technologies.

Sometimes existing control regulations require all of their available capital. DOE and the Environmental Protection Agency will be working together to study this issue.

Questions from Senator Wallop

International Energy Intensity Comparisons

Question 2: During your testimony you compared energy consumption per unit of Gross National Product for the United States and other industrialized nations.

a. Would you provide further details for the record, distinguishing between the United States, other industrialized nations and developing countries?

Answer: The Central Intelligence Agency recently collected some data on energy use per unit of Gross National Product across nations in 1988. EIA then analyzed some of the reasons behind the differences.

Of the six nations examined, they found that Japan used the least amount of energy per unit of output, about 40 percent less than the U.S., followed by West Germany, which used about 30 percent less than the U.S..

East Germany used about 20 percent more than the U.S., the U.S.S.R. used about 50 percent more and China used almost four-and-one-half times as much as the U.S.

There are many factors behind these variations, including differences in lifestyle, population density, end-use energy prices, economic structure and climate. Some of the reasons that the U.S. uses more energy per unit of GNP than most other industrialized countries are the considerably higher transportation requirements in the U.S., more building space per capita in both homes and offices, a harsher climate and higher levels of primary processing of raw materials.

A study by Pacific Northwest Laboratories, comparing U.S. and Japanese energy use intensities, showed that the U.S. compares more favorably with Japan when individual energy-using sectors are examined. Climate and floor space per person explain most of the difference in residential and commercial energy use. While the U.S. uses almost twice as much energy per mile in passenger travel, we use about half as much energy per mile as Japan in our movement of freight. In the manufacturing sector, the U.S. uses about the same amount of energy as Japan to produce a dollar's worth of goods.

Question: b. What fraction of the United States' energy consumption per unit of GNP is associated with environmental requirements? How does this compare with other industrialized nations and developing countries?

Answer: None of the energy consumption data collected in the U.S. is disaggregated using this criterion.

QUESTIONS FROM SENATOR WALLOP

Question 3: American industry is encountering increasingly tough international competition. Our trade deficit is partially explained by new foreign competition. But the challenge is whether we can be more effective in delivering American developed energy technologies to the marketplace as a source for new businesses and jobs.

a. Would you agree that the advancement of new energy supplies and technologies must serve as a critical component in the growth of the United States economy?

b. Would you also agree that the commercialization of new energy technologies can serve to reduce our energy related trade balance?

Answer: a. We agree that the advancement of new energy supplies and technologies are fundamental for continued U.S. economic growth. To the extent that fewer energy and capital resources are required to meet a given level of demand for goods and services, U.S. firms can be more competitive in the international marketplace and the "freed up" resources can be applied to spur additional economic growth. Some of the ways that new energy supplies and technologies can contribute to U.S. economic growth include:

- Improving the efficiency by which energy is used for running factories; as feedstocks for materials such as plastics or petrochemicals; for transportation; and for lighting and heating the home and the workplace;

- Reducing the costs of energy by increasing competition and technological choice; and

- Creating export and trade opportunities for low-cost, environmentally sound technological goods and services.

b. We agree that increased exports of U.S. technological goods and services improve our economic performance by generating new jobs and decreasing our trade deficit. Such exports can also help other countries, particularly developing countries and Eastern Europe, solve their energy, environmental, and economic problems by providing more efficient technologies and practices. Finally, exports can enhance energy security for both industrialized and developing countries by reducing pressures on global oil supplies and prices. For these reasons, the NES promotes increased exports of energy-related technological goods and services.

QUESTIONS FROM SENATOR WALLOP

Nuclear Power

Question 4: Would you agree that until we can once again assure that nuclear power is a viable option in our nation's energy future, the economic and foreign policy implications of our dependence on imported oil will remain a threat to our nation's economic health and energy security?

Answer: Nuclear power is used exclusively to generate electricity. Only about 5 percent of total U.S. electricity generation is fueled by oil. Furthermore, most oil-fired generation today is used to meet utilities' peak demand, while nuclear power is used for base demand.

However, nuclear power has played a major role in reducing our former heavy reliance on oil for generating electricity. It enhances U.S. energy security by providing the Nation's electricity industry with a reliable domestic fuel source and technology. Nuclear power also has positive environmental benefits because, unlike fossil-fired generation, it does not emit sulfur dioxide, nitrous oxides, or any greenhouse gases. The Administration believes that it is imperative that the Nation retain the nuclear power option for baseload electricity needs.

QUESTIONS FROM SENATOR WALLOP

Energy Regulation

Question 5: Would you agree that there is a need to streamline or remove certain regulatory procedural barriers that unreasonably restrict the availability of domestic energy supplies and technologies such as natural gas or hydro-electric power, or constrain the deployment of new, advanced and often more environmentally benign energy technologies?

Answer: Yes, regulations that unduly restrict the use of domestic energy resources represent self-inflicted economic costs and lost opportunities. The NES proposes a comprehensive program of regulatory reform for natural gas, coal slurry transportation, nuclear, hydropower and other renewables, and for the entire electric utility sector. These reforms will broaden the range of fuel and technology choices, increase competition, reduce consumer costs, and improve environmental quality.

QUESTIONS FROM SENATOR WALLOP

Question #6: The Congress has enacted numerous environmental policies to deal with the potentially adverse impacts of our industrialized economy such as the impacts of energy production, transportation and utilization.

(a) Would you agree that existing national environmental requirements already have substantially internalized these potential environmental costs?

(b) Would you agree that for so-called "least cost" energy planning to be effective such analyses need to consider both the national security costs and benefits as well as environmental costs and benefits?

(c) What are the current limitations regarding methodologies for performing "least cost" energy planning?

Answer: (a) Yes. Legislation such as the Clean Air Act Amendments, the Clean Water Act, and the Resources Conservation and Recovery Act, among others, all impose requirements that must be borne by manufacturers and ultimately by consumers. The additional costs associated with these requirements change economic behavior and, as such, represent the internalization of many environmental costs and benefits.

(b) "Least cost" energy planning is one aspect of the integrated resource planning (IRP) processes currently being undertaken by many of the States. It is a process that seeks to put utilities in the position of energy service providers, not just electricity generators. This will allow utilities to profit from cost-effective demand management investments, as well as from electricity generation investments. Each State represents one experiment of how integrated resource planning might be done. Some include explicit consideration of environmental externalities in calculating which investments are cost-effective. Others do not. The Department of Energy believes that more information is needed before judgement can be passed on whether integrated resource planning should include both environmental and national security benefits and costs. To that end, the Department is involved in an international effort to develop a methodology for performing full fuel cycle analyses that could be utilized in evaluating alternative energy resource options. This effort will attempt to ascertain how best to include both the costs and the benefits associated with particular energy resource options.

(c) The current limitations regarding methodologies for performing integrated resource energy planning include regulatory and other disincentives, and the difficulty in accurately measuring the costs and benefits associated with particular programs. These limitations are addressed by the NES through proposals that support State IRP activities and development of methodologies to determine the full fuel cycle costs and benefits of energy technologies. DOE plans to continue support for refinement of IRP methodologies.

Department of Energy
Washington, DC 20585
March 19, 1991

The Honorable J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

On February 21, 1991, Admiral Watkins testified before your Committee on the Administration's National Energy Strategy.

Earlier today we submitted answers to questions from yourself and Senators Ford, Wirth, Bingaman, Fowler, Nickles, Hatfield, Murkowski, Seymour and Wallop to supplement the record.

Enclosed are answers to your question 1 (Oil Pipeline Deregulation) and question 2 (Enhanced Oil Recovery); Senator Wirth's questions 7, 8, 12, and 13, and Senator Wallop's question 1. The remaining answer to question 2 (ANWR) is still in the clearing process and will be forwarded to you as expeditiously as possible.

If we can be of further assistance to you or your staff, please contact our congressional hearing coordinator, Barbara Barnes, on (202) 586-6341.

Sincerely,

Jacqueline Knox Brown
Assistant Secretary
Congressional and Intergovernmental
Affairs

Enclosures

QUESTIONS FROM SENATOR JOHNSTON

Oil Pipeline Deregulation: Why is this necessary.

Question 1. **What does the deregulation of oil pipelines have to do with increasing domestic oil production?**

Answer: **The Administration's oil pipeline deregulation proposal will increase domestic oil production. Under the Administration's proposed legislation, new oil pipelines would be deregulated. Deregulation of new pipelines would remove significant uncertainty regarding regulatory treatment and lower the cost of operation by eliminating unnecessary regulatory costs. These effects make it more likely that oil pipelines will be built to marginal production areas, thereby increasing domestic supply.**

In addition, current regulation makes it difficult for existing oil pipeline companies to discount prices for oil pipeline transportation. The Administration's proposed legislation would deregulate oil pipeline markets where producers and consumers are protected by competition. Deregulated pipelines would have more flexibility in pricing and discounting. Such pricing flexibility may also make marginal production areas economic to develop.

QUESTIONS FROM SENATOR JOHNSTON

Enhanced Oil Recovery

Question 2: **How much additional domestic oil do you believe could be produced as a result of enhanced oil recovery technologies, and what steps can Congress take to facilitate this?**

Answer: In the NES, enhanced oil recovery technologies are a portion of a more general category called "advanced oil recovery technology." This category includes both advanced secondary recovery and enhanced oil recovery technologies.

The proposed near-term research and development measures for advanced oil recovery technologies would result in additional oil production of 1.4 MMBD by 2005. These measures would add total oil reserves ranging from 5 billion barrels to more than 25 billion barrels, depending on the level of oil prices. In the five-year period from 2005 to 2010, additional oil production from application of near-term and long-term measures could be increased to more than 3 MMBD. The use of EOR methods alone accounts for approximately 68% of that amount.

An aggressive EOR program will preserve access to existing, producing oil reserves by delaying well abandonments and increasing reserves and production. Because of cost and lack of technical resources, most independent oil producers cannot engage in R&D activities. They rely on the results of research performed by others. If oil prices are relatively low over the long term, and if technology advances are delayed, as much as 65% of the remaining oil resource not recoverable by conventional means could be in abandoned zones by 1995, and over 75% could be abandoned early in the 21st century. This abandonment would only be reversed when the price of oil rises enough to justify resumption of the development of these resources.

The Congress has facilitated increased use of enhanced oil recovery technologies by enacting a 15% tax credit for enhanced oil recovery as part of the tax incentive package included in the 1990 budget reconciliation legislation. Congressional support of the Department's FY 92 advanced oil recovery budget request of $52 million, an increase of 24 percent over the FY 91 request, would expedite implementation of these NES proposals.

QUESTIONS FROM SENATOR WIRTH

Probability of Finding Oil in ANWR

Question 7: For the purposes of the NES results, did you assume that recoverable oil would be found in the Refuge? What is your latest estimate of the probability of such a find?

Answer: Yes. This assumption is based on Department of the Interior (DOI) assessments of ANWR oil resources. These assessments are derived from seismic work in the area, studies of ANWR's surface geology, and data from similar geologic settings. In addition, ANWR is located between known petroleum provinces in the United States and Canada.

Recent DOI studies indicate that there is a 46% chance that economically recoverable oil may exist in ANWR. Moreover, if oil is found to be present in commercially recoverable quantities, the mean resource estimate is at least 3.6 billion barrels.

This 46% probability estimate combines both geologic and economic risk factors. The geologic risk factor includes, among other components: presence of a hydrocarbon source, timing of oil formation, occurrence of oil migration from source to traps, and quality of reservoir rock. The economic risk factor determines the minimum field size required for economic development in ANWR.

QUESTIONS FROM SENATOR WIRTH

Probability of Occurrence

Question 8. Did you include any other possible contributors to domestic oil production or oil use reduction in your results that had less than a 50% probability of occurrence? If so, what were they? Did you discount their contribution based on their probability?

Answer: Yes. According to resource estimates prepared by the Minerals Management Service, the probability of the occurrence of oil is less than 50% in four of the currently restricted OCS areas. These areas are the North Atlantic (39%), Mid-Atlantic (44%), Washington/Oregon (25%), and North Aleutian Basin (2%).

The OCS production estimates reported by the NES are the risked resource estimates, which take into account the probability of occurrence. The use of probabilities in this fashion is unique to oil and gas exploration and was not applied in analyzing other NES options.

QUESTIONS FROM SENATOR WIRTH

Question 12: Please explain the relationship between the NES and the FY 1992 budget request. In particular, would the 1992 budget request fully fund the NES initiatives? For example, would the initiative to "expand efforts to develop advanced renewable technologies" shown on page 19 of the NES be consistent with the 2% increase in renewable energy R&D in the FY 1992 budget?

Answer: The DOE FY 1992 budget fully supports those actions in the NES requiring funding in FY 1992. Funding for any initiative needs to reflect the stage of development of that initiative. For example, an initiative that contemplates laboratory work ordinarily would require less funding than one contemplating a demonstration project. We are confident that DOE NES FY 1992 funding would support NES actions, including those related to advanced renewable technologies. Although the FY 1992 Budget Request for renewable energies is only 2 percent greater in aggregate than FY 1991, it includes a 10.4 percent increase for Solar and Other Renewables and more sharply focuses funding on promising technologies in photovoltaic, wind, and biofuels, where 9.7, 26.1 and 11.1 percent increases are requested respectively. This focusing is consistent with the thrust of the NES. In addition, further increases are included in the outyear projections which the White House has provided to CBO. Photovoltaics is one area in particular which is slated for further increases, and it also received a significant increase in the FY 1991 request (27%), based on its clear support in the NES process at that time.

QUESTIONS FROM SENATOR WIRTH

Question 13: Page C-22 of the full report says that 2.4 MMBD of the reduction in oil use claimed for the NES is due to increased use of alternative fuels and oxygenates, yet page C-26 lists the alternative fuel consumption in 2010 as 0.5 trillion cubic feet of compressed natural gas, 0.5 quads of biofuels and 0.1 quads of electric vehicles. Roughly, these seem to total only 0.5 MMBD. Please explain the apparent discrepancy here.

Answer: Page C-22 says that 4.3 Quads or 2.4 MMBD of oil savings result from alternative fuels and oxygenates. While the estimate in quads is correct, the conversion to barrels of oil should be 2.2 MMBD, not 2.4. Of the total 3.4 MMBD of oil savings estimated in 2010, the breakdown by fuel type accounting for the 2.2 MMBD reduction is as follows:

- 1.4 MMBD of liquid alternative fuels (p. 63 graphic);
- 0.6 MMBD of oxygenates (p. 63), of which 0.4 MMBD is assumed to be from methanol and ethanol and 0.2 MMBD from natural gas;
- 0.5 Tcf or 0.2 MMBD equivalent of compressed natural gas (p. C-26); and,
- 0.1 quads or 0.05 MMBD equivalent of electricity (p. C-26).

These savings total 2.2 MMBD in 2010.

QUESTIONS FROM SENATOR WALLOP

Question 1:	Recent events in the Gulf have highlighted the critical need to move forward on the development of a national energy policy. A focused energy policy not only furthers our national security interests, but it creates American jobs, helps with our balance of payments, and lessens our dependence on distant markets and foreign cartels. a. Would you agree that our energy problems exist not because there is a shortage of domestic energy alternatives, but because of the lack of a long-term, comprehensive, and consensus-based national energy strategy? b. Would you agree that incentives are needed to foster greater use of domestic supplies of fossil fuels -- natural gas, oil, and coal -- which we have in abundance?
Answer:	a -- This nation does not lack for energy resources. What we have lacked is an ability to rise above special interest disputes that pit one fuel or technology against another. A fundamental objective of the NES is to show the Nation what our choices are, and what the consequences of those choices are, both now and for the future. With this full picture on view, perhaps we can do a better job of making energy decisions, and avoiding decision by default. b -- We can make greater use of America's fossil fuel supplies, consistent with economic growth and environmental protection by: (1) removing barriers to markets for natural gas; (2) encouraging advanced oil recovery; (3) allowing development of promising resource areas under strict environmental safeguards; and (4) supporting the development and use of clean coal technologies. We believe financial incentives provided by the Federal Government should only be used as a last resort.

Department of Energy
Washington, DC 20585
May 9, 1991

The Honorable J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

On February 21, 1991, Admiral Watkins testified before your Committee on the Administration's National Energy Strategy.

On March 19, 1991, we submitted answers to questions from yourself and Senators Ford, Wirth, Bingaman, Fowler, Nickles, Hatfield, Murkowski, Seymour and Wallop to supplement the record. We indicated that question 2 (ANWR) was still in the clearing process at that time. That question has been cleared and is enclosed for the record.

If we can be of further assistance to you or your staff, please contact our congressional hearing coordinator, Barbara Barnes, on (202) 586-6341.

Sincerely,

Jacqueline Knox Brown
Assistant Secretary
Congressional and Intergovernmental
Affairs

Enclosure

QUESTIONS FROM SENATOR JOHNSTON

Question 2: With regard to revenues, as you know, my legislation dedicates receipts from ANWR to be used for priority energy related projects to enhance energy security and reduce our dependence on imported oil. Under the provisions of this bill, the Secretary of Energy is directed to prepare a list of these projects, utilizing the criteria set forth in the legislation, and is to expend these funds for projects and programs identified on the list.

While I recognize that the position of the Administration is that these revenues should be deposited as miscellaneous receipts in the Treasury to reduce the deficit, could you comment generally on the mechanism set forth in S. 341 and your ability to comply with these provisions should the Congress choose to adopt this approach?

Answer 2: As noted in the question, the Administration position is to retain all ANWR receipts into a miscellaneous account in the Federal Treasury as a fair way of ensuring that the benefits of ANWR development are distributed among all U.S. taxpayers. However, should the Congress choose to adopt the approach in S. 341, we offer the following comments.

Section 9601 (b)(1) requires the Secretary to prepare a list of energy related projects "in descending order of priority." Section 9601 (c) specifies the type of projects that are to be considered: "energy efficiency and conservation; energy efficiency in transportation; energy research, development, demonstration, and commercialization; fossil energy, including clean coal technology and oil and gas extraction; electrical energy transmission and generation; advanced nuclear reactor programs pursuant to Title XII of this Act; and renewable energy resources, such as solar, geothermal, and hydroelectric power."

Section 9601 (d) identifies seven factors that are to be given special attention in preparing the rank-ordered list: "(A) minimize or reduce reliance on imported oil; (B) reduce energy costs to consumers; (C) enhance reliability of energy supplies and national security; (D) foster the commercialization of new energy technologies; (E) increase the efficient use of nonrenewable resources such as coal, natural gas, and oil; (F) have the least potential social costs and adverse impacts on the environment; and (G) enhance the diversification of the Nation's domestic energy supply."

Given a reasonable amount of discretion in the application of the factors and ranking required, DOE believes it could develop lists of projects, as this section contemplates. Of more concern, however, is the funding mechanism itself. The proposed mechanism is cumbersome and unclear, and, based on consultations with OMB, does not meet the requirements of the new Budget Enforcement Act (BEA) of 1990.

S. 341 would authorize direct spending from earmarked ANWR receipts, which is subject to the annual pay-as-you-go (PAYGO) requirements of the BEA of 1990. Assuming prompt enactment of S. 341, it is projected that initial proceeds from leasing would be received in FY 1993. Preliminary OMB estimates of this direct spending total approximately $1 billion returning to the State of Alaska in FY 1993, with an additional $1 billion being earmarked for energy programs (beginning in

FY 1995). In FY 1996, $600 million would return to the State of Alaska, and an additional $600 million spent for energy programs. These OMB estimates are tentative and subject to change.

As we interpret the language of S. 341, a list of proposed energy spending projects would be submitted in the next President's budget following the initial receipt of bonus payments, which would be the FY 1995 budget. The funds would then be released for expenditure 12 months later. It is likely that the projects that would be supported by these funds are multi-year in nature, so that actual outlays would extend over a number of years, beginning in FY 1995.

The BEA requires that to avoid a PAYGO sequester new direct spending must be offset fully in each fiscal year FY 1991 through FY 1995. Under S. 341, even though new ANWR receipts would generate net deficit reductions of approximately $1 billion in FY 1993 relative to the current services baseline, it would authorize new, non-offset direct spending of about $1 billion in FY 1995. This is inconsistent with the BEA and would be subject to a point of order on the Senate floor on these grounds, which would require the votes of 60 Senators to override. The Administration opposes any new direct spending unless offset consistent with the BEA.

There are several ways that the PAYGO problem could be resolved. One alternative would be to modify the timing of the receipts and/or outlays so that the level of outlays would match receipts in each year. Another alternative would be to require that the expenditures from the fund be subject to appropriations. Since the nature of the projects to be supported by the fund are similar in characteristics to other on-going discretionary DOE energy R&D projects, this would not pose any programmatic problems.

The attached is in response to a question from Senator Seymour to Secretary Watkins (DOE) at the February 21 hearing on the National Energy Security Act of 1991. (See page 569 of printed hearing #102-5 (pt. 1)). This information was not available at the time the hearing went to press.

We have requested $16 million for activities related to alternative fuels utilization in the Transportation Sector. These activities are focused on three main areas: (1) implementation of the Alternative Motor Fuels Act of 1988, (2) engine optimizations, and (3) emissions characterizations. Additionally, in the Solar Energy budget request (under Biofuels Energy Systems Transportation Sector-Biomass Fuels), $44 million ($29 million for DOE and $15 million for USDA) is included for alternative fuels development in three main areas: (1) biochemical conversion, (2) thermochemical conversion, and (3) feedstock development. Furthermore, $84 million is requested in FY 92 for R&D in vehicle propulsion systems, such as gas turbines and fuel cells, and in electric/hybrid vehicle.

Appendix II—Additional Material Submitted for the Record

Statement of
Air Transport Association of America
Before the Senate Committee on Energy and Natural Resources
February 21, 1991

Mr. Chairman, the Air Transport Association of America welcomes the opportunity to submit this statement in conjunction with your hearings concerning establishment of a National Energy Policy. ATA member airlines collectively account for approximately 97 percent of the revenue passenger miles flown in the United States and about the same percentage of the freight ton miles. The airlines, having learned from the energy crises of 1973-1974 and 1979-1980, would like to offer some comments on our experience, our response to those crises, and the adverse consequences we feel yet today.

Since the last oil crisis and especially since airline deregulation, carriers have introduced a number of fuel saving steps. Overall, we estimate that the industry has improved fuel efficiency by 47 % since 1974. Had we not implemented these fuel saving measures, the United States would need to produce or import more than 1,000,000 additional barrels per day of jet fuel, a quantity not currently available on the world market.

Some of the things airlines have done include the following:

- Cruise speed has been reduced. The reduction of a jet's speed from 520 to 500 miles-per hour results in a 7 % fuel saving on a 500 mile flight.

- Flight simulators have been used far more extensively in pilot training to eliminate fuel consuming training flights. Thousands of extra flights annually have been eliminated saving millions of gallons of fuel and yet still providing the level of training needed to carry the public safely.

- Computerized flight planning has resulted in the selection of altitudes that yield the minimum consumption of fuel.

- Fuel conservation measures are also employed today before an airplane takes off and after an airplane lands. Aircraft are being held at departure gates, with engines shut down, when there is likely to be a delay on takeoff. Often one or more engines is shut down as the aircraft taxis to the arrival gate upon landing, further improving fuel efficiency.

- Airlines have invested substantial sums, in the tens of billions of dollars, to purchase newer fuel efficient airplanes.

- Airlines have also significantly increased equipment utilization, conserving millions of gallons of fuel by taking advantage of new, more efficient jets to carry more people per aircraft.

Because the industry has worked so diligently on improving efficiency there is virtually no more room for fuel efficiency improvements in the current crisis.

We continue to preach the gospel of fuel conservation both here and abroad. The U.S. carriers have launched another major push to change the international jet fuel standard from Jet A-1, to Jet A, the fuel we use in the United States. Jet A-1 has a lower freezing point and must be used on some routes, but those routes are the exception, not the rule. Refiners have indicated that at least a 5 % increase in jet fuel availability would be forthcoming were the international standard changed to match the practices of the U.S. carriers. And if the laws of supply and demand are valid, there should be a reduction in fuel costs commensurate with the increase in supply.

Additional fuel conservation measures can be implemented, but these issues require government action. Immediately after the Iraq invasion of Kuwait, the Secretary of Transportation established an Aviation Industry Energy Conservation Task Force to review aircraft operations, airport practices, and air traffic control procedures which could be taken to reduce consumption. The airlines and airports reviewed and implemented several initiatives and are taking additional measures which were not adopted as common industry practices after the 1973 shortages.

There are some operations areas being pursued which will also require assistance from FAA in the form of regulatory accommodation in areas such as dispatch and fuel reserve requirements and acceptance of high gross landing weights.

Air traffic control is another matter. The air traffic controller work force has been extremely cooperative with pilots in efforts to reduce fuel consumption, and the government has begun to adopt policy changes to put into effect air traffic control fuel efficiency measures.

Those are steps that can and should be taken under any circumstances irrespective of the outbreak of hostilities. The current economic environment in which the airlines operate is extremely hostile. Even with all of the fuel efficiency measures we have adopted, we are hemorrhaging due to the combined impact of a recession, drastically increased fuel costs, and fears of terrorism brought on by the war in the Middle East.

Fuel represents our second largest item of expense amounting on average to about 18 % of total operating costs. Some carriers have instituted fare increases in an attempt to cover the soaring fuel cost. But the economy is so weak they have had to offer a number of discounts in order to stimulate demand for air transportation, seriously undermining the effectiveness of these fare based efforts to recover the fuel cost increase.

The seriousness of this situation can be seen from a few relevant facts. Two major air carriers have filed for chapter 11 bankruptcy protection within the past two months. One major carrier with six decades of service to the public is now being liquidated.

For the first time in its modern history, the industry had a substantial net loss in the heretofore always profitable third quarter. Compared to 1989, third quarter losses represented a net change of a half billion dollars; compared to 1988 a net change of over $ 1 billion. We anticipate industry net losses will total $ 2 billion for the full year 1990. And for the six months consisting of the fourth quarter 1990 and first quarter 1991 we anticipate losses of nearly $ 2.5 billion, not taking into account changes in fuel supply, costs, and revenues which have occurred since the beginning of hostilities in January.

Even before the week ending August 3 was over, we were faced not only with fuel price increases, (we consume almost 10% of the daily domestic refinery throughput) but also calls to provide lift to fulfill national defense needs. Since that time we have been through everything from a multi billion dollar increase in the cost of doing business to the activation, for the first time in its history, of the Civil Reserve Air Fleet. (Our members have carried more than 62 % of the troops and 22 % of the cargo in Operation Desert Shield.)

Now with the war underway reports of traffic dropping from terrorism fears indicate that our revenues will suffer even more than they have from the economic downturn.

Previous fuel shocks pale by comparison to the magnitude and suddenness of the 1990 crisis. In 1979 jet fuel was 57 cents per gallon, and it took two years to reach over $ 1.00 per gallon. In 1990, it took two months! In August our fuel was 63 cents per gallon and by the middle of October it was $ 1.39.

Unfortunately, this run up is in spite of an abundance of crude oil and relatively large inventories of jet fuel. Prices for jet fuel skyrocketed far in excess of prices for other refined petroleum products and far in excess of what one would anticipate from the orderly working of a marketplace governed by supply and demand.

Let me cite a few figures to demonstrate this point. For consistency, we have used weekly averages of spot petroleum prices obtained from the Department of Energy. We realize that the cost to any individual purchaser of petroleum products may vary as a result of contractual arrangements, however, this is the way data is presented by the Department through the Energy Information Administration.

Attached to my statement is a chart which demonstrates the extremely severe fuel cost run up which has damaged the fragile economics of providing air transportation. The relationship between price increases in crude oil and price increases in refined petroleum products has bee substantially out of kilter.

Referring to the chart entitled Weekly Averages of Spot Petroleum Prices, you will see that at the time of the invasion, the spot prices for wholesale gasoline, jet fuel, and No. 2 home heating oil were 71.6, 63.5 and 62.8 cents per gallon, respectively. As of the end of December, the spot prices for gasoline, jet fuel, and No. 2 home heating oil were 68.4, 84.5, and 80.7 cents per gallon, respectively.

As of January 31 instead of jet fuel costing 10 cents per gallon less than gasoline as was the case six months ago when Iraq invaded Kuwait, jet fuel cost 7 cents per gallon more than gasoline, a net change of 15 cents per gallon. In October the net change was almost 50 cents per gallon in the relationship between gasoline and jet fuel prices. While we are pleased to see the level of distortion moderate, we continue to be frustrated by the unanswered questions surrounding this turn of events. Airlines can little afford to bear this disproportionate share of the increase in crude oil costs. We consume 16,000,000,000 gallons of jet fuel each year. Consequently an increase of only one cent per gallon results in $ 160 million more in annual fuel costs.

This discrepancy between jet fuel and gasoline costs would not be so unreasonable if the supply of jet fuel were down, but such is not the case. Jet fuel inventories have been consistent with prior year inventories, and in recent weeks have exceeded prior year inventories by as much as 24 % on a week to week comparison.

There have been published reports that the cost of jet fuel has increased due to several factors which unfortunately our experience and review of the facts indicates are not borne out.

Each of these rationales is based on a supply/demand theory and suggests that in some manner demand has boosted prices. The prices for crude and refined products have little relationship to supply/demand theory, which result in our feeling that these rationales are questionable at best.

Theory # 1. Loss of Kuwaiti refineries -- These refineries are very sophisticated and produced significant quantities of jet fuel. But the output of other refineries has more than made up for the loss of this refinery capacity. Domestically our jet fuel refinery production and inventories since September have regularly exceeded year ago measures. Worldwide inventories of jet fuel are also high.

Theory # 2. Reduced quality of the crudes -- Crude oil produced to make up for the loss of Kuwaiti crudes is of lower quality. But we question whether the cost of refining the lower quality crudes into jet fuel exceeds the costs of refining the lower quality crudes into gasoline and home heating oil by the excess margins being charged for jet fuel. For example, during the week ending October 19 compared to the week ending August 2, crude oil was up 33 cents per gallon, gasoline 25 cents per gallon and jet fuel 61 cents per gallon. Jet fuel demand was not up and jet fuel inventory was up. We have trouble understanding a rationale which suggests that the marginal cost of refining the same lower quality crude into jet fuel cost so much more than the cost of refining the lower quality crude into gasoline.

Theory # 3. Military operations -- Middle East operations have increased demand for jet fuel. But the facts fail to bear out this purported rationale for price increases. First of all, until January all military needs in Saudi Arabia were being filled from local refineries and inventories. Furthermore, military operations in the United States have virtually nothing to do with jet fuel inventory. The airline industry uses Jet A, a kerosene based fuel akin to home heating oil. The military fuel specification is for naphtha based JP-4, a jet fuel produced from a different portion of the barrel.

We believe the jet fuel price spiral is related to the publicity surrounding gasoline price increases and the airlines' inability to adjust schedules quickly. Consumers see the price of gasoline in two foot tall numbers as they drive down the street. They do not see the price of jet fuel. Consumers can alter their driving and buying practices, by car pooling, using public transportation, forsaking frequent short trips, and buying lower octane gasoline to save money.

Jet fuel consumption, on the other hand is relatively inelastic -- some 25 customers buy 95 % of the jet fuel sold in this country in order to maintain their scheduled 19,000 flights per day.

As you consider the National Energy Policy, we think it is particularly important to establish the steps to be taken should there be a supply interruption. First there is a need for a contingency plan. Our economic health has already been severely damaged; we can not afford to watch our already weakened financial condition deteriorate while the government contemplates the fuel situation.

We need to know where we will obtain fuel, how much we will be able to obtain, and what we will pay for it. We need to obtain approximately 1.4 million barrels per day of jet fuel from our usual suppliers at the rates customarily paid. That means no price controls, no allocation plans, and no unwarranted interference in the marketplace at any level of government -- Federal, state, or local.

In the current instance, we support the drawdown of the Strategic Petroleum Reserves. Inasmuch as production increases which have made up for the elimination of Kuwait and Iraq supplies may not continue to be sustained, reduced production can only be made up from strategic stockpiles. Insuring an adequate supply is the key to moderating the price increases which would otherwise occur with the outbreak of war.

We feel it is imperative that restrictions be imposed on the ability of local authorities to allocate transportation fuels away from transportation uses. We feel that monitoring and restrictions, if necessary, be imposed on the exportation of refined petroleum products. Lastly we would like to see intensified monitoring of speculative activity in the commodities markets. Any other government action, or the failure of the government to take these actions, is destined to result in even more adverse economic consequences than will occur due to the interruption of crude oil supply.

The mechanism by which oil and refined product prices are set in the marketplace has changed since 1973. Neither the seven sister oil companies nor the OPEC ministers set prices anymore, rather it is the action taken in the commodities market. Those individuals and companies hedging or speculating in the commodities markets bid prices based upon their judgements concerning supply and demand.

The airline industry applauds the effort which this committee has undertaken to explore our national energy policy. If all segments of society undertook the kinds of energy conservation activities which we have undertaken in the last 17 years, U.S. petroleum demand and prices would be somewhat less than they are today. Hedging in the commodities market would not be needed to serve as protection against pricing unwarranted by supply/demand fundamentals.

Even with the conservation measures which we have taken, our industry can no longer take the energy shocks which we have witnessed in the last six months. To the extent national energy policies bring about greater protection for the American people, we support what must become an ongoing initiative, designed to allow the marketplace to operate freely, openly, and competitively, with preservation of our natural resources high on our list of energy priorities.

As you debate this issue, we urge you to pursue a balanced approach to promote conservation and renewable fuels while assuring continued availability for industries such as ours which are dependent on petroleum products.

WEEKLY AVERAGES OF SPOT PETROLEUM PRICES

	CRUDE OIL (WTI) ($/BARREL)	WHOLESALE GASOLINE (C/GALLON)	JET FUEL (C/GALLON)	HEATING OIL NO.2 (C/GALLON)
AUGUST				
WEEK 1	23.0	71.6	63.5	62.8
WEEK 2	26.8	84.3	73.8	72.1
WEEK 3	27.3	90.1	78.8	74.2
WEEK 4	30.3	105.4	97.0	87.7
WEEK 5	27.1	89.8	82.7	74.9
SEPTEMBER				
WEEK 1	30.2	103.8	92.4	82.9
WEEK 2	31.0	100.1	92.6	81.4
WEEK 3	34.2	93.4	99.8	87.6
WEEK 4	39.1	102.8	120.6	102.1
OCTOBER				
WEEK 1	36.6	94.5	125.1	97.2
WEEK 2	39.9	98.7	139.4	102.7
WEEK 3	36.8	97.0	124.3	96.7
WEEK 4	31.3	91.6	101.2	83.1
WEEK 5	35.2	97.2	111.9	89.6
NOVEMBER				
WEEK 1	34.6	97.3	103.5	87.3
WEEK 2	33.9	95.7	104.2	87.7
WEEK 3	31.5	85.0	97.7	85.7
WEEK 4	30.9	82.2	92.8	85.8
WEEK 5	32.3	83.4	97.1	90.7
DECEMBER				
WEEK 1	27.7	70.6	88.6	83.2
WEEK 2	26.4	66.0	79.9	77.4
WEEK 3	27.6	66.1	80.1	77.0
WEEK 4 (I)	27.5	68.8	84.5	80.7
JANUARY 91				
WEEK 1	25.7	65.3	74.6	72.3
WEEK 2	27.5	72.5	80.6	76.9
WEEK 3	26.9	73.4	83.0	80.0
WEEK 4	24.1	64.3	74.0	72.8
WEEK 5	21.4	66.7	73.6	71.5

I) DECEMBER 31 DATA IS INCLUDED IN WEEK 4

SOURCE: U.S. DEPARTMENT OF ENERGY

National Independent Energy Producers

Telephone: (202) 783-2244
Facsimile: (202) 783-6506

WRITTEN STATEMENT OF THE
NATIONAL INDEPENDENT ENERGY PRODUCERS
SUBMITTED FOR THE RECORD

before the

UNITED STATES SENATE
COMMITTEE ON ENERGY AND NATURAL RESOURCES

Washington, DC

HEARINGS ON THE NATIONAL ENERGY STRATEGY

February 21, 1991 (1991)

I. THE CONFLICT IN THE PERSIAN GULF REENFORCES THE NEED FOR A NATIONAL ENERGY STRATEGY

The National Independent Energy Producers is pleased to submit these comments for the record as the Senate Energy Committee considers the Administration's proposed National Energy Strategy. This hearing and the ones that will follow are particularly timely as the United States strives to develop a national energy policy against the backdrop of political and military conflict in the Middle East.

The Persian Gulf Crisis is another strong warning that the U.S. must be diligent in its pursuit of a comprehensive set of national energy goals and strategies. If the past is prologue, then political upheaval will reoccur in the Middle East causing disturbances and uncertainties in the energy supply, economy and national security of the United States. We should seize this opportunity to craft a policy that promotes security and efficiency in all aspects of the energy industry.

This policy must not only meet our energy needs, it must strengthen our economy, protect our environment and help American consumers. If the last ten years in the electricity industry taught us anything, it is that competition will guarantee efficiency in power generation. Competition means giving utilities maximum generation options from which to choose to best serve their ratepayers. Removal of bottlenecks to entry for generation suppliers under the Public Utility Holding Company Act is critical to strengthening competition in generation and promoting our overall goals.

II. INDEPENDENT ENERGY PRODUCERS PLAY A CRITICAL ROLE IN ENERGY PRODUCTION

The National Independent Energy Producers (NIEP) is an association of companies that generate electricity for sale to utilities and develop cogeneration projects for a variety of users.

601 Thirteenth Street, N.W. Suite 320S Washington, D.C. 20005

NIEP membership is comprised of publicly traded and privately held corporations which represent the entire spectrum of fossil fuel-fired, renewable and alternative technologies, including hydro, pumped storage, biomass, geothermal, wind, wood and waste-to-energy plants, as well as oil, gas and coal-fired cogeneration and wholesale generation facilities. NIEP independent developer members also represent diverse elements of the electric generation industry, including companies established in conjunction with enactment of the Public Utility Regulatory Policies Act (PURPA), subsidiaries of fuel suppliers, architectural and engineering firms, large manufacturers, and utility affiliates. We do not build ratebased powerplants.

NIEP is committed to increasing competition in power markets. Independent energy has grown out of the entrepreneurial and competitive climate fostered by enactment of PURPA in 1978. Today, there are 32,700 megawatts of generation in operation from independent power facilities -- the equivalent of over 30 large nuclear power plants. Last year, independents brought more new generating capacity on line to meet demand than electric utilities -- 68 projects totaling almost 6,000 megawatts. Further, it is projected that independents will provide about half of all new generating capacity by the year 2000.

III. THE ELECTRICITY INDUSTRY AND THE US ECONOMY FACE A SIGNIFICANT CHALLENGE

The North American Electric Reliability Council projects that U.S. demand for electricity will grow by 120,000 megawatts by the year 2000. Retirement of aging, utility generating plants over this period could double the market size.

As a result, the nation will invest $100 - $200 billion in new generation to meet this demand. If we do it inefficiently, we could do untold damage to our economy. If we do it wisely, we could reap large economic rewards. For example, a 20 percent increase in efficiency in these investments could yield $40 billion in savings for electricity consumers.

The policy question is not "Will the needed generation be added?" but rather, "How efficiently?" The challenge facing policy makers is to create the competitive structures to make the investment in generation efficiently.

IV. COMPETITIVE POWER MARKETS BENEFIT CONSUMERS, THE ECONOMY AND THE ENVIRONMENT

There are numerous benefits to consumers from competitive power markets:

- Lower costs result when construction and operating risks shift from ratepayers to wholesale generators. This shift promotes efficiency and penalizes incompetence.
- Reliance on market forces, rather than regulation, to determine prices optimizes the efficiency of the system, reduces costs, and increases our competitiveness.
- Competition stimulates technological improvements. Since enactment of PURPA, QFs have produced energy generation and environmental control advances, and independents

have led the way in developing commercial applications of innovative geothermal, coal, gas, solar, wind and other technologies.

- Independents offer a variety of supply options to utilities enabling them to better plan for market demands.

Responding to the Middle East crisis in the early 1970s, Congress opened the door to competition in the electric generation industry in 1978 through PURPA. The Act created a new class of non-utility independent generators known as qualifying facilities (QFs) -- cogenerators and small power producers. QFs sell electricity at wholesale to utilities and must meet steam load size and technology requirements. Since 1978, they have provided critical energy savings and have led the way toward competition in generation markets.

V. THE RECORD OF INDEPENDENT POWER GENERATORS SUPPORTS PUHCA REFORM

Since enactment of PURPA in 1978, independent generators have not only brought significant new capacity on line, they have performed reliably and efficiently.

Pacific Gas & Electric Company (PG&E) reported to the California Public Service Commission in 1988 that the 1621 megawatts of non-utility generation in its service territory operated at a 94.8% availability factor.[1]

In emergencies, independents have performed well. During the 1989 earthquake in California, independents stayed on line and helped PG&E to restore service quickly. During the deep freeze in Texas last year, cogenerators provided utilities with power in excess of firm contract commitments.[2]

By November 1990, utilities had signed contracts for nearly 10,500 megawatts of capacity through competitive bidding.[3] In each case, the utility decided to buy capacity rather than build it because it was cheaper. Independents generate power efficiently because they must. Utilities pay independent generators only for the power that they deliver. Unlike utilities, independent generators are not guaranteed a rate of return on their investment.

VI. THE PUBLIC UTILITY HOLDING COMPANY ACT (PUHCA) IS AN OBSTACLE TO MEETING THE CHALLENGES OF THE 1990's

QFs alone, however, will not be able to meet the demands of the 1990s. A second group of non-QF independent generators known as independent power producers have become increasingly important to competitive power markets. Freed from PURPA's requirements, IPPs offer more flexible site and size options for power plants. They also permit developers to be more responsive to utility demands for dispatchable contracts. Finally, removal of PURPA-imposed restraints on economic efficiency will promote more innovation and cost-savings.

Unlike QFs, IPPs are subject to regulation under the Public Utility Holding Company Act. Most IPPs must organize themselves as separate corporate entities because today's financial markets require it. Although IPPs do not have captive ratepayers and do not control transmission facilities, PUHCA regulates these entities as utility holding companies. Thus, PUHCA inhibits independent power producers by subjecting them to the extensive corporate and financial regulations and outright prohibitions on investments of an act designed to regulate franchised multistate utility holding companies.

Congress passed PUHCA in 1935 to protect consumers against market power abuse by multistate utility holding companies. The Act still serves this useful purpose and should continue to do so. Fifty-five years later, however, it has had an unintended effect. It has become an obstacle to the efficient production of power at competitive prices.

VII. WE MUST REFORM PUHCA TO CAPTURE THE BENEFITS OF COMPETITIVE POWER

Competition in generation markets cannot develop fully until the current complex regulatory environment under PUHCA that controls investment decisions and operations changes. The largest statutory barrier facing competition is PUHCA, and amending the law to rid it of its unintended effects is a necessary step towards meeting future electric demands efficiently.

By advocating PUHCA reform, we are not calling for "deregulation" of generation; only removal of the PUHCA barriers to IPP development, creating regulatory structures which serve the needs of competitive generation markets. PUHCA reform would leave unchanged the structure of current electricity rate regulation. Wholesale rates for electricity by utilities and IPPs would continue to be approved by the FERC under the Federal Power Act. Rates for QFs would continue to be capped at state approved avoided cost. The retail rates for the ultimate consumer would still be regulated by the states.

Amendments to PUHCA would only affect the corporate regulation of IPPs. Current regulatory scrutiny of corporate structures of utilities would continue at the state level and by the SEC for PUHCA registered holding companies. Corporate oversight of utilities and IPPs under the Federal Power Act, the Securities Act and state law would be unaffected. Only IPPs would be freed from the need for SEC approval of investments, other transactions, and the limitations and geographic restrictions on investments prescribed by PUHCA.

VIII. S. 341 AND THE NATIONAL ENERGY STRATEGY (NES) ARE BASES FOR PUHCA REFORM

NIEP applauds the efforts that Senators Johnston and Wallop have made to promote competition in electric power markets by proposing amendments to PUHCA in Title XV of S. 341.

Similarly, NIEP is very pleased that the Administration has included PUHCA reform in Division A, Title I of the National Energy Strategy submitted by the Department of Energy.

However, to achieve the promised benefits of competitive power markets and to protect against the abuse of market power, PUHCA reform must be structured to promote full and fair competition within the context of a state's integrated resource plan. Whether they contract through a formal bidding program or through arms-length negotiations, wholesale generators must demonstrate that they are the most appropriate supply option available and that they cannot exercise market power to undermine competition in generation markets.

The following examples are three ways that Congress could encourage full and fair competition:

> First, federal and state regulators should determine that a wholesale generator's contract was market-tested through an arms-length negotiation or other competitive process.
>
> Second, franchised utilities which take financial interests in wholesale generators should: a) file a tariff to establish terms and conditions for transmission service; and b) be able to demonstrate that adequate protections exist to prevent ratepayer subsidy of wholesale generators.
>
> Third, rate-based facilities should not be converted to wholesale generators without approval by state regulators.

Finally, for power markets to become truly competitive, transmission access and pricing must be both available and fair to wholesale generators. Until such time that transmission reforms make markets truly competitive, additional protections against market power abuse are appropriate. A protection which Congress should consider is to limit ownership or control of a wholesale generator by a franchised utility to 50 percent or less.

PUHCA reform structured in these ways offers maximum flexibility to utilities, on behalf of their ratepayers, and the states which regulate them, to select the kind of power which meets their needs. Participation in the wholesale generation market would be voluntary. Utilities who need new capacity, in conjunction with their state regulators, would decide whether or not they want to:

1) buy power from a wholesale generator,

2) participate in the wholesale generation market, or

3) build their own cost-of-service plant.

In short, this approach gives utilities additional supply options without closing existing ones. It is a balanced proposal that offers the greatest opportunity to achieve economic efficiencies, fuel savings and environmental protection at the lowest possible cost to consumers.

The current conflict in the Middle East makes it imperative that the U.S. develop a national energy strategy. Reform of the Public Utility Holding Company Act should be a vital component of that strategy.

The National Independent Energy Producers is hopeful that Congress will work toward amendments to PUHCA which maximize the benefits of competitive power markets through full and fair competition.

1. *Jan Hamrin, "Non-Utility Power and the Reliability Issue,"* *The Electricity Journal, 17, June 1989.*

2. *Gulf Coast Cogeneration Association, Survey, 12/29/89*

3. *"Current Competition," Vol. 1, No. 3, November 1990, p.16.*

Written Statement of
Denise Bode
President, Independent Petroleum Association of America
Before The
Senate Energy and Natural Resources Committee
Regarding Natural Gas Legislation
Supplementing the March 7, 1991 Hearing Record
on S. 341, S. 570, and S. 741

Executive Summary

I. Provisions Supported by IPAA

- A level playing field is needed to permit fair competition between domestic and imported gas.[1] Currently, Canadian pipeline rate design provides imported gas with an artificial competitive advantage over domestic gas. DOE testified on March 7 that it merely "rubber stamps" all import applications. FERC then "defers" to DOE and refuses to exercise its jurisdiction over facilities to address the problem. This happens even thoughCongress has expressed its intention that these rate design differences be considered and that DOE or FERC attach appropriate conditions to import authorizations. Congress should reaffirm its determination to assure that free trade is fair trade and the burden of proof in an import proceeding should be on the applicant.
- "As-billed" passthrough of producer demand charges would promote domestic exploration and development on pipelines which offer comparability of sales and transportation service.[2] Currently, when a producer structures a wellhead contract to charge separately for standing ready to provide service (a demand charge), FERC policies force pipelines to collect these amounts in the pipeline's commodity rates, if at all. As a result, wellhead prices are lower, and the pipelines are reluctant to offer such payments to producers, because they run the risk of not recovering these costs. A pipeline offering reasonably comparable service should be permitted to collect producer demand charges from its customers on an as-billed basis.
- Multiple pipelines filing joint tariffs to cover a sequence of transportation could promote more efficient access to markets.[3] Independents frequently must use several pipelines to get their gas to market. If each pipeline charges a flat "postage stamp" rate regardless of length of haul, using more than one pipeline to transport gas to market can become too expensive for small producers. The combined rates can become so high as to compel

---

[1] S. 741 § 713. IPAA opposes S. 570 Title II, Subtitle B which would provide competitive advantages to imported gas.

[2] S. 741 § 713.

[3] S. 741 § 708.

producers to confine their sales to customers on the pipeline to which their gas is connected. With joint tariffs, a single lower rate could be established for transportation over a sequence of pipelines.

- Gas market demand enhancement provisions are necessary.[4] For example, an electric generation plant should be allowed to add natural gas or clean coal technology (which will lower its emission levels) without falling under the new source performance requirements of the Clean Air Act.[5]
- New statutory provisions to encourage growth in gas demand, including PUHCA reforms to encourage gas-fired independent power producers should be adopted.[6]
- Congress should provide an antitrust exemption for small producer marketing cooperatives.[7] This would help independents aggregate larger packages of gas necessary to compete in the marketplace.

II. Provisions Opposed by IPAA

- IPAA opposes deregulation of the pipeline merchant function. Pipelines are natural monopolies, and provisions which permit them to control access to markets without regulatory oversight will harm independent producers.and consumers.[8]
- Legislation which deregulates new pipeline construction if the pipeline's investment is "at risk" will not work unless pipeline is truly at risk. At present, when an investor proposes a new pipeline, the FERC reviews the plan to ensure that the pipeline is appropriate for its gas supplies and markets. This is intended to prevent developers from overbuilding unnecessary pipeline facilities at ratepayer expense. In order to promote new pipeline construction, some proposals would eliminate this review process if the investor is willing to assume the risk that the project will not be fully used in the future. Because of the technical difficulty in defining how the investor will be placed at sufficient risk to deter unnecessary projects, perhaps this issue is best left to FERC as a regulatory matter. Any "at risk" requirement should be for the life of the project, and not just for a few years, with the prospect for a ratepayer bailout if the project's economics go sour.[9]

---

[4] S. 741 Title VII;

[5] S. 341 § 5101.

[6] S. 341 Title XV (exemption from Public Utility Holding Company Act.)

[7] S. 341 § 10007.

[8] S. 570 § 205, particularly ¶ g. S. 741 § 710-711 avoids some of the problems of the S. 570 language, but is still troublesome.

[9] S. 570 § 205, particularly ¶ k. S. 341 § 10001(d) would permit a pipeline to eliminate its risk and roll in the cost of expanded facilities after 10 years.

III. Additional Matters Which Should Be Addressed in the Legislation

- FERC should be given "teeth" to successfully implement a balanced natural gas strategy which will encourage domestic exploration and development, including transfering Section 3 of the Natural Gas Act (gas imports) from DOE to FERC. From 1938 to 1977, FERC and its predecessor the FPC, regulated all aspects of gas imports under the Natural Gas Act. Since 1984, DOE has had the complete authority to regulate imports, but has chosen not to create a level playing field between domestic and imported gas. These responsibilities should be returned to FERC[10] to assure that all gas suppliers receive fair treatment from federal regulators. Other statutory provisions clarifying that FERC has authority to set rates and grant certificates by rulemaking may also be helpful.[11]
- A legislative framework requiring public utility commissions to encourage open access at the state level is needed. FERC's open access transportation program requires pipelines to offer transportation to all if transporting for anyone. This provides producers with multiple markets for their gas and consumers with a choice of suppliers. However, many local distribution companies (LDCs), which are regulated by the states, do not have similar requirements. Hence, LDCs can exercise monopoly power over competitors for end-use markets. The benefits of open-acess transportation should be extended to LDCs.
- FERC's jurisdiction over the brokering of interstate pipeline capacity by LDCs should be clarified. Currently FERC regulates the allocation of interstate pipeline capacity. Some LDCs are proposing to broker their capacity on interstate pipelines to end-users. The FERC is more likely to implement procedures with a national focus than the state public utility commissions that are subject to state and local pressures. Although FERC has jurisdiction over these matters, the state commissions are challenging FERC on this point. Clarifying legislation will avoid a protracted controversy.
- The Congress should mandate that each interstate pipeline file a new Section 4 general rate case at least once every three years. This is appropriate because such filings are currently required by regulations subject to waiver.

---

[10] S. 570 § 221 would establish a Natural Gas and Electricity Administration within DOE. FERC is now an independent regulatory agency. Regardless of whether FERC remains an independent agency, the same entity responsible for regulating domestic pipelines should be responsible for regulating gas imports, in order to assure a level playing field.

[11] E.g., S. 341 § 10005.

Written Statement of
Denise Bode
President, Independent Petroleum Association of America

Issue by Issue Analysis

Thank you for providing the Independent Petroleum Association of America (IPAA) with the opportunity to present its views on the natural gas provisions of **the Johnston-Wallop Bill (S. 341)** and **the National Energy Strategy Act (NESA) (S. 570)**, which are the subject of the Committee's March 7 hearing. IPAA has testified separately on other sections of this important legislation. This testimony also addresses **the Wirth-Hatfield Bill (S. 741)**, which was introduced after the March 7 hearing.[12]

1. Background on IPAA and the Interests of Independents

The Association represents independent crude oil and natural gas producers in all 33 states with oil and natural gas production. Independents drill the overwhelming majority of all U.S. wells and find more than half of the nation's new oil and natural gas reserves. Independents operate as individuals, partnerships, or public corporations, ranging in size from very small, one-person ventures to large firms with hundreds of employees engaged in extensive oil and natural gas exploration, development and production. According to a recent study, independents derive 48% of their revenues from domestic natural gas. Small, privately-owned oil and gas companies represent about 40% of our nation's natural gas production. Accordingly, the natural gas provisions of these bills are of particular importance to independents, and in turn, the fate of the independent gas producer is of particular importance to the nation's quest for energy stability and self-sufficiency.

2. Background on the Need for Regulatory Reform

The natural gas industry has changed rapidly, and the statutory and regulatory structure must keep pace with those changes. In the mid-1970's the natural gas industry was hampered by a dual intrastate-interstate market, with artificial wellhead price controls hampering new gas supplies from reaching the interstate market. The Natural Gas Policy Act of 1978 (NGPA) began the deregulation of wellhead prices and created a nationwide transportation network across both intrastate and interstate pipelines. Gas producers responded by increasing the deliverability of supplies.

During the period of natural gas curtailments, FERC adopted rate structures which were designed to discourage industrial and utility gas consumption. Although FERC has made minor changes in its rate structures since the end of curtailments, it has failed to adopt rate policies which will enhance the ability of natural gas to compete for industrial and utility markets. The net effect of the cumulative policies of FERC and the state commissions has been to discourage industrial and utility gas consumption, harming consumers and producers alike by reducing throughput in a time of surplus. These policies have also reduced the economic and regulatory stability at the wellhead necessary to justify continued healthy development of the domestic gas resource base. Although these policies were intended to protect residential consumers, the net effect of the lower total consumption of natural gas has been to shift a greater portion of transmission and distribution cost onto residential and commercial customers.

---

[12] Sen. Wirth also introduced S. 662, "The Gas Policy Reform Act" on March 14, 1991. The provisions of S. 662 are included in S. 741.

The best solution for this problem is to adopt legislative and regulatory initiatives which will promote growth in the natural gas industry, both at the burnertip and the wellhead. In this manner, the nation can enjoy not only the environmental benefits of natural gas, but the economies of scale that would result from more efficient utilization of the gas industry infrastructure as well.

3. The Need for a Level Playing Field for Imported Natural Gas

The NESA, S. 570, ignores a major problem which has limited reliance on the nation's exploration for, and development of natural gas supplies. Because of rate design differences between United States and Canadian pipelines, domestic gas is at a competitive disadvantage when competing with Canadian gas. Canadian pipelines are allowed to recover a greater portion of their fixed costs in demand charges than are allowed by FERC which regulates domestic pipelines. Because gas distributors make their purchasing decisions based on a comparison of commodity rates, the Canadian gas appears to be less expensive than domestic supplies, even though the total cost of the Canadian gas (taking into account both demand and commodity charges) can be more expensive.

Since 1938, prior approval by the Federal government has been required to export or to import natural gas. The NESA proposes to repeal Section 3 of the Natural Gas Act and deregulate natural gas imports. The Department of Energy's March 7 testimony offers two rationales for this proposal. First, there is a general advocacy of deregulation with the government staying out of the way of "consenting adults" who reach an agreement.[13] Second, DOE characterizes its current approach toward implementing Section 3 as being a "rubber stamp" and sees the repeal of Section 3 as merely removing an unnecessary layer of regulation.[14] Neither argument justifies the repeal of Section 3.

---

[13] Tr. 12, March 7 Hearing.

[14] Tr. 42.

On the first point, the fact is that the people who bear the cost of imported natural gas — the end-users — are frequently not a party to the agreement at the border. Thus, in many cases, they do not actively consent or play a role in negotiating the terms of the border contract. Instead, the importing local distribution company, who in many cases has an equity interest in the importing pipeline,[15] will negotiate the terms of the import transaction to maximize the utilization of their facilities, rather than attempt to secure the lowest price for the imported gas.

On the second point, since the enactment of Section 3 of the Natural Gas Act in 1938, the provision has served an important regulatory function and prevented an "attractive gap" in the regulatory scheme. Prior to the creation of DOE, Section 3 was administered as an integral part of the Commission's oversight of the portion of the natural gas industry which was not subject to state control. Prior to the enactment of the NGPA, all sales for resale in interstate commerce were subject to the rate and certificate jurisdiction of the Commission under the Natural Gas Act. Thus, a single uniform approach was applied, and FERC's Section 3 authorization was deemed to cover any sale for resale which occurred at the border.

In 1978, Congress made a determination that the wellhead market for natural gas was competitive and began a transition from utility regulation of such sales toward decontrol. The subset of jurisdictional sales for resale defined as "first sales"[16] were subject to decontrol. The NGPA, as amended by the Wellhead Decontrol Act of 1989,[17] will deregulate all "first sales" by 1993.[18] "First sales" are any sales for resale which precede a pipeline, distributor, or end-user taking title to natural gas.

Sales for resale downstream from the pipeline are not "first sales" and remain subject to FERC certificate and rate jurisdiction. Congress did not then, nor does it now, have a factual basis upon which to conclude that these downstream markets are competitive enough to warrant deregulation. Yet, that is precisely what S. 570 would do. Not only would it repeal Section 3 of the Natural Gas Act (thereby depriving any Federal administrative agency of supervision of border transactions), but it would remove jurisdiction over any subsequent sale for resale of imported gas, including *all* sales downstream of the pipeline.[19] It would also preempt both Federal and State review of the purchasing practices of the imported gas purchases.[20] S. 570 does not preempt State review of local distribution company purchasing practices of domestic gas, thus giving a further competitive advantage to imports.

---

[15] For example, Pacific Gas & Electric owns Pacific Gas Transmission, the pipeline which connects its system to Canada. A group of Northeast distributors own a 31% equity share of the Iroquois Gas Transmission System.

[16] NGPA Section 2(21), 15 U.S.C § 3301(21).

[17] P.L. 101-60, July 26, 1989.

[18] NGPA Section 121, 15 U.S.C. § 3331.

[19] S. 570 § 213 would enact this as a new §3(a) of the Natural Gas Act.

Prior to the transfer of Section 3 authority to the DOE, the factors considered in authorizing imports included: the security of supply, the effect on U.S. balance of payments, the price proposed to be charged, the effect on proximate domestic supplies, and the need for the gas.[21] These remain valid elements of the public interest, although they have been brushed aside by DOE on the grounds that "competition" somehow supplants these traditional regulatory concerns.[22] Yet, the fact remains that domestic "competition" with Canadian gas is based on a regulatory scheme which discriminates against domestic suppliers and the U.S. trade deficit has grown more severe due to our dependence on foreign energy, as indicated by Attachment A. Similarly, despite years of litigation before the FERC and the Courts both in pipeline rate proceedings as well as an endless stream of rulemakings, the promise of a truly competitive North American gas marketplace has yet to be realized. As a result, when DOE relies upon competition in the burner tip gas market to supplant direct regulation of imports, it merely invites the import sponsors to abuse even more the current regulatory system with a series of "rate gimmicks" which take advantage of an unlevel playing field between domestic and imported supplies.

FERC and the Courts have previously recognized this problem and adopted Opinion No. 256[23] which permits FERC to modify the demand/commodity split of imported gas costs when regulating resale rates within the United States. As drafted, S. 570 would remove FERC's jurisdiction to make such adjustments, because that would "treat ... imported natural gas *while it is within the United States* differently than any other natural gas." The policy goal adopted in Opinion No. 256 by the FERC, and endorsed by independent producers, was to create a "level playing field" between United States and Canadian natural gas. The fact that Canadian natural gas is treated differently north of the border must be taken into account if such a level playing field is to be established. Yet, S. 570 requires FERC and the State Commission to disregard such facts and would ensure and perpetuate discrimination against domestic gas in mandating so-called equal treatment

---

[20] S. 570, new §3(b). Also, as a "first sale" such gas costs would be guaranteed passthrough under NGPA § 601, 15 U.S.C. § 3431.

[21] West Virginia Public Service Comm'n v. DOE, 681F.2d 874, 851 (D.C. Cir. 1982); Distrigas Corp. v. FPC, 497 F.2d 1057, 1065 (D.C. Cir. 1974), cert. denied, 419 U.S. 834 (1974).

[22] New Policy Guidelines and Delegation Orders from the Secretary of Energy to Economic Regulatory Administration and Federal Energy Regulatory Commission Relating to the Regulation of Natural Gas, 49 Fed. Reg. 6,684 (1984).

[23] Natural Gas Pipeline Co. of America, 37 FERC ¶ 61,215 (1986), rehearing, 39 FERC ¶ 61,218, aff'd sub nom. TransCanada PipeLines Ltd. v. FERC, 878 F.2d 401 (D.C. Cir. 1989).

"within the United States." Title II, Subtitle B of S. 570 would prevent the government from eliminating the distortions created by foreign rate designs and should not be adopted. Instead, we believe that a provision similar to § 714 of S. 741 would promote a level playing field and should be adopted.

A second problem with S. 570 is that it would provide the President with greater authority to set timetables or waive statutory requirements for imported gas projects. This authority does not exist, nor was it recommended by the administration, for new domestic gas projects. Proposed Section 3(d) of the Natural Gas Act would provide:

> Upon finding that the exportation or importation of natural gas is in the national interest, the President may waive any law relating to the exportation or importation of natural gas or may specify, by schedule or otherwise, when a particular law relating to the exportation or importation of natural gas is considered satisfied if the appropriate Federal or State agency has not taken final action.

There is no policy basis for providing the President with this authority solely for import and export projects. At present, the President has ample emergency authority under Title III of the NGPA, without regard to whether gas is of imported or domestic origin. Similarly, FERC has authority to act in emergencies under Section 7(c) of the Natural Gas Act. Independent producers do not see a need for additional emergency authority at this time.

IPAA agrees with DOE's assessment, at least in the context of the current regulation of imports, that "the current system of regulation needs a major overhaul, not just tinkering around the edges."[24] However, IPAA's recommended overhaul would be to transfer all authority over imports from DOE back to the Commission so that a single body could adopt a uniform set of policies over both domestic and imported gas, thereby giving the Commission full and undeniable authority to create a level playing field.

Instead of adopting legislation which would further harm domestic producers, Congress should promote a goal on which we can all agree, i.e. reduction of reliance on imported oil. Establishment of a level playing field for domestic and imported natural gas will encourage reliance on gas, while adoption of the Administration's natural gas import provisions will back-out as much or more domestic gas as imported and domestic oil, exacerbating rather than reducing our balance of payments problem. Instead of the S. 570 provisions, IPAA recommends adoption of § 714 of S. 741. This provision would require import authorizations to be conditioned "upon action by the Commission to redress any anticompetitive impacts on United States gas producers including, but not limited to, competitive disparities resulting from different rate designs applied to the transportation of domestic gas and imported supplies." Two additional drafting points should be considered in crafting a solution to this problem. First, a provision should be added to clarify that the burden of proof in any Section 3 proceeding should be on the applicant. Second, this "level playing field" condition should apply to both existing and new import authorizations, not just "the approval of any import application." In this manner, the Commission (or the Secretary of Energy, if authority is not transfered from DOE) would have an affirmative duty to level the playing field with respect to existing as well as new import authorizations.[25]

---

[24] Tr. 12.

4. "As-billed" Passthrough of Producer Demand Charges Can Contribute to a Level Playing Field

Certain provisions, such as Section 713 of S. 741, would provide domestic producers with the opportunities currently afforded foreign producers, i.e., the opportunity to recover some of their costs in pipeline demand charges. At present, FERC ratemaking policies require interstate pipelines to recover all domestic producer payments in commodity rates, while foreign producers are allowed to negotiate demand charge recovery of a portion of their wellhead revenues. In addition, marketers and distributors reselling gas purchased under two-part wellhead prices are not subject to the requirement of commodity-only recovery. These policies have two adverse results. First, given the historically predominant role of interstate pipelines as purchasers in the wellhead market, if they are unable to pass through producer demand charges on an "as-billed" basis, it is unlikely that such contracts will gain widespread acceptance in the industry. Second, the ability of non-pipelines to offer such contracts may tend to undermine the ability of interstate pipelines to continue to serve a merchant function.

In general, IPAA supports the approach taken in § 713 of S. 741. It would require "as-billed" passthrough of producer demand charges unless the Commission determines, after a hearing, that the reselling interstate pipeline does not offer a reasonably competitive transportation alternative to its sales service. IPAA believes that comparablility of service between pipeline sales and transportation functions is an essential element in restructuring pipeline services and that pipelines which fail to offer reasonably comparable service should not be entitled to as-billed passthrough of two-part producer rates. We understand that this provision would place the burden of proof on the party challenging the as-billed flow through of the demand charge. As drafted, § 713 would provide this benefit to any "first sale" of natural gas, as that term is defined in § 2(21) of the NGPA. Because FERC retains the right to disallow such first sale costs upon a showing of favoritism toward affiliated purchases or "fraud, abuse or other similar grounds," FERC can exercise overall supervision of any abuse of this two-part rate form in extreme cases of market failure.

---

[25] Because DOE has adopted the practice of issuing blanket import authorizations which do not become effective until the date of first deliveries, there is a large inventory of approved, but unused import authorizations. If the § 714 condition were to apply prospectively only to new authorizations, this large inventory of Section 3 authorizations would represent a serious loophole which would thwart the intent to establish a level playing field.

Producer demand charges can be particularly important in cases where gas is sold to electric generation customers. Since most power pools dispatch power based upon lowest variable cost, a gas supplier with a lower commodity rate can guarantee that its electric generation customer will be brought on line in preference to other plants which might pay for gas supplies of equal cost on a commodity-only basis.

5. Market Enhancement Legislation is Needed.

Natural gas consumption has declined from a peak of 21.7 Tcf in 1971 to 16.2 Tcf in 1986. Preliminary figures indicate consumption of only 18.5 Tcf in 1990. Given the environmental and cost benefits of natural gas (which sells at a significant discount to the Btu equivalent price of imported oil), national consumption should have increased. In addition, the abundant, proven domestic reserve base of gas is an additional advantage which would warrant vastly increased consumption. However, governmental policies, motivated by a concern in the 1970's that gas must be conserved to prevent shortages, inhibited the natural growth of gas markets. Congress can reverse this trend by enacting legislation to facilitate the increased use of natural gas. For example, the provisions in both S. 341 and S. 741 which provide for exemptions from the Public Utility Holding Company Act for independent power producers can assist in increasing the natural gas share of the electric generation market.

6. Small Producer Marketing Cooperatives Should Be Exempt from Antitrust Laws.

Traditionally, natural gas was sold under long term contracts to whatever pipeline was closest to a particular well. The well operator would typically market the production of minority working interest owners under its gas sales contract with the pipeline. In addition, state regulation to protect the rights of all interest owners in a well or field tended to assure that small producers would receive equal treatment with larger producers in gaining markets for their gas. Unfortunately, with the abrogation of long-term contracts and the current market dominated by spot-market arrangements, small producers are at a considerable disadvantage in marketing their production. For example, some pipelines impose onerous balancing tolerances and some purchasers set minimum volumes for the packages of gas which they are willing to purchase. For this reason, IPAA supports the antitrust exemption for small producer marketing cooperatives proposed in Section 10007 of S. 341.

We have one drafting concern with Section 10007. As drafted, it would merely exempt such cooperatives from *per se* antitrust doctrines. However, participants in such cooperatives could be still subject to costly fact-specific litigation upon the allegation that "the anticompetitive effects substantially outweigh the procompetitive effects" of the particular cooperative. The bill does not define whether this inquiry would be made in the context of a national gas market or if some local market definition would apply. Independent producers would favor an unconditional exemption for such cooperatives, based upon the fact that a competitive wellhead market for gas would exist, even if every eligible small producer joined a cooperative. This is evident from the number of producers who are too large to be eligible to join a cooperative under the proposed 6,000 Mcf/day quailification standard. Regarding the qualification standard, IPAA believes that an annual, rather than daily, volume of production is a more reasonable basis for determining eligibility. Given the current market, some producers may have production shut in for a significant portion of the year, and a daily measure might disqualify a number of producers with a minor overall participation in the gas market. The level of an annual qualification standard requires further analysis of actual production data, and IPAA will make additional recommendations at a later date.

In sum, IPAA believes that a general antitrust exception rather than the limited relief afforded by § 10007(b) would be most appropriate.

7. Section 4 Rate Reform

Independent producers are more vulnerable than other segments of the industry to pipeline overcharges. The gas production of independents is typically priced on a "net-back" basis, so that any increase in pipeline transportation charges usually reduces wellhead revenues. At present, a pipeline is free to file an excessive rate increase request with FERC. Because FERC has only 30 days in which to act on the proposal, it provides a very short period for public comment. Because pipelines are required to serve their sales customers and state commissions with rate filings, other elements of the gas industry have advance notice of these proposals. However, producers and other shippers do not have the benefit of these requirements and sometimes must respond to a Federal Register notice of a pipeline rate filing on the day of publication. For this reason, we support the proposal to provide FERC 60 days to act on such rate filings, with the expectation that the change would provide for a longer public notice period.

In addition, at present, FERC's authority to order refunds is limited to the extent of a rate increase, even if the previously filed rates were unreasonably high. We support the proposed amendment which would authorize FERC to order refunds down to the levels determined to be just and reasonable without regard to the previously effective rates.

8. Section 311 Construction.

Section 716 of S. 741 would codify existing law that facilities used exclusively for Section 311 transportation are not subject to Natural Gas Act jurisdiction. It would also make explicit the requirement that the constructing pipeline must participate in open access transportation. We are troubled that the provisions of both S. 341 and S. 570 on this point would render such construction jurisdictional in the process of granting the Commission the ability to authorize it by rule or order. The better course would be to retain the non-jurisdictional status of Section 311 construction.

9. Section 311 "on behalf of" test.

We favor elimination of the "on behalf of" limitation for all Section 311 shippers. Gas markets will function most efficiently if the greatest number of possible buyers and sellers are permitted freedom to structure transactions on a level playing field. At present, the shipper in a transportation arrangement receives any rate refunds ordered by the Commission. Because of the "on behalf of" test, producers frequently must structure their transportation agreement to designate a distributor as the shipper. As a result, producers whose netback gas revenues are determined by pipeline transportation rates do not automatically benefit from subsequent refunds of overcharges.

10. "At Risk" Construction

Various bills would permit pipelines to construct facilities without the traditional regulatory review and authorization if the investors are "at risk." Historically, FERC has found enforcement of such "at risk" conditions difficult to impose in any meanigful way. Any "at risk" condition accepted by a pipeline in its certificate proceeding is the target of repeated attempts to erode the condition in subsequent pipeline rate cases or to seek modification of the certificate based upon "changed circumstances." Any at risk condition must be for the life of the project if it is to succeed in bringing the discipline of the marketplace to bear in preventing uneconomic pipeline construction.

There is a natural tension between simple, system-wide transportation rates and various "optional certificate" procedures. On the one hand, producers want as simple a regulatory system as possible, including stable rules for preventing undue discrimination. On the other hand, if a pipeline has a bottleneck, it makes sense for parties willing to pay to expand capacity at that bottleneck to have priority of service through the new facilities.

Any policy which addresses this problem must also address who "owns" the right to the cheap expansibility of an existing pipeline system. (The cost of expanding capacity on a pipeline varies depending upon how much expansion has occurred before.) Perhaps such complex issues are best left to FERC's discretion. We are concerned that legislation creating optional procedures may inadvertently prejudge this issue in a manner which may favor one segment of the gas industry over another.

11. Open Access at the State Level

A number of states are implementing capacity brokering plans for their distribution companies. Some state commissions are also attempting to assert jurisdiction over the manner in which their distributors broker interstate pipeline capacity. This raises the potential for undue discrimination against shippers who compete with local distribution companies when making sales to end-users. Legislation is needed which would encourage states to establish open-access transportation or would encourage DOE to become active in state proceedings to foster open-access (See 42 U.S.C. §7133(a)(6) and (7).)

The Congress can also reconfirm that FERC has exclusive jurisdiction over the brokering of jurisdictional pipeline capacity, and that state action cannot remove that authority.

In addition, the Congress can express its intent that LDCs which seek to avail themselves of the benefits of open access transportation should have the obligation to afford the same option to their end-user customers as well.

12. Deregulation of the Interstate Pipeline Sales Function

In addition to deregulation of imported natural gas without a hearing, § 205(b) of S. 570 would provide for a permanent deregulation of the interstate pipeline sales and transportation into a given market after a one-time hearing to demonstrate that competition for that market exists and that the pipeline's sales and transportation services are offered in that market on a not unduly discriminatory basis. Section 710 of S. 741 would deregulate sales for resale in such circumstances. Similarly, § 711 of S. 741 would deregulate new services "which can be fully supplanted with other preexisting services" which remain jurisdictional.

Independent producers do not believe that the factual basis for deregulation of city-gate markets exists at this time. Certainly, the Congress should not undertake initiatives to deregulate city-gate markets without first assuring that producers will have equal access to end-user markets located behind those city-gates. Otherwise, the monopoly power of the local distribution companies will fill the void left by deregulation.

In terms of drafting, § 710 of S. 741 is preferable to S. 570 because it provides the Commission with an opportunity to condition its decontrol determination and the right to revoke the determination. In contrast, under S. 570, once the Commission makes its finding, the service would be permanently deregulated, even if circumstances change. A second important difference is that S. 570 would deregulate either the transportation service to the customer, the sales service to the customer, or both. In contrast, S. 741 would deregulate just the sales service. (It is difficult to imagine how comparability between sales and transportation service would be maintained if the Commission deregulated either sales or transportation without imposing conditions.) Assuming that the deregulation of sales service can be justified based upon the availability of multiple sellers operating under open access, a similar rationale is not available for the deregulation of *transportation*. Unless there is a significant amount of excess pipeline capacity serving a particular market, interstate pipelines will continue to hold monopoly power regarding their transportation service. This makes regulatory oversight essential.

Section 711 of S. 741 poses fewer difficulties if the term "fully supplanted" is defined with reasonable care. Given the past litigation over tariff availability clauses and "full requirements" conditions, pipeline tariffs could be constructed to force users to purchase the deregulated alternative because the regulated one is not made available as a practical matter. Unless the shipper/purchaser is free to choose any combination of regulated and deregulated service, it is possible that the rights afforded to the interstate pipelines under § 711 could be abused.

13. General Section 4 Rate Cases Should Be Required At Least Once Every Three Years.

General Section 4 rate cases protect the customers of a pipeline by assuring that the pipeline's costs and rate revenues are brought into balance. They also provide a forum in which to reassess the terms and conditions of pipeline service. If the Congress amends Section 4 to permit refunds to levels below previously effective rates, interstate pipelines will be reluctant to file for rate decreases under Section 4. At present, the Commission requires as a precondition for maintaining a Purchased Gas Adjustment Clause (PGA) that each pipeline holding a PGA must file a general Section 4 rate case at least once every three years. Thus, the widespread industry practice is to file rate cases at least this frequently. However, many pipelines are surrendering their PGAs in exchange for implementing gas inventory charges. As a result, a growing number of interstate pipelines will no longer be subject to the three year rate filing requirement. A statutory provision would provide FERC with authority to mandate such filings. Of course, the Commission should be afforded discretion to waive the requirement in appropriate cases.

Conclusion

IPAA appreciates this opportunity to comment on these natural gas bills and looks forward to working with the Committee as it develops a more efficient and responsive federal natural gas regulatory environment.

The American Society of Mechanical Engineers

Suite 218
1825 K Street, N.W.
Washington, DC 20006-1202
202-785-3756

Statement of the

Task Force of the Energy Resources Group

of the

American Society of Mechanical Engineers

on the

"National Energy Security Act of 1991"
(S 341)

for the

Committee on Energy and Natural Resources of the

U.S. Senate

March 21, 1991

The Task Force of the Energy Resources Group of the American Society of Mechanical Engineers (ASME) welcomes the opportunity to provide its views on the National Energy Security Act of 1991 (S 341).

We are in agreement with the objectives of a national energy strategy as stated by President Bush in 1989:

> "---- achieving a balance among our increasing need for energy at reasonable prices, our commitment to a safer, healthier environment, our determination to maintain an economy second to none, and our goal to reduce dependence by ourselves and our friends and allies on potentially unreliable energy suppliers."

The Task Force believes that one of our highest priorities as a nation is to develop an energy strategy that properly balances national concerns for global economics, energy security for the U.S., and environmental issues. Senate bill S 341 appears to be a constructive companion to the administration's efforts to forge such a national energy strategy. However, much more should be and can be done to meet our goals than is contained in S 341.

We have reviewed S 341 and our specific comments on some of the sections of the bill are presented below.

TITLE III - ENERGY EFFICIENCY

The Task Force recommends a more aggressive approach to conservation than is evident in the bill, since it is the only consensus issue emerging from the Department of Energy's public hearings on a national energy strategy. Such an aggressive approach should include authorization for development of efficiency standards for appliances, buildings, equipment and processes for future use with voluntary and/or legislated conservation actions.

We agree with the proposed energy efficiency rating and labeling of residential buildings, lighting, windows and appliances. We commend the proposed development of minimum energy efficiency standards for federal buildings and public housing, electric lights, motors and pumps, and utility transformers. In addition to the above, we feel that minimum performance standards should be developed for a broader range of energy technology applications, including residential buildings, appliances, and other energy equipment.

While the improved energy audits in industry would identify conservation opportunities, we feel that these conservation actions would be more likely realized if the actions were tied to tax incentives and revolving loan programs.

TITLE IV - RENEWABLE ENERGY

The bill places emphasis primarily on the commercialization of near-term renewable energy technologies. Additional long-term R&D activities which will continue to develop the advanced concepts for the next century should be addressed.

Currently, sizable Japanese and European investments in renewable technologies are being made, which could overwhelm the viability of fragile, emerging U.S. renewable energy industries. We believe that S 341 should define a more aggressive federal program requiring incremental increases in funding of basic R&D. Such a program could substantially improve the competitive position of U.S. renewable industries.

Many U.S. developed renewable technologies are nearing commercial readiness. However, because of the current economic climate, industries, financial institutions, and public concerns are not able to assume the risk of initial investment. In this light, the Task Force supports the implementation of production tax credits (~~such as~~ contained in HR 776 (Sharp and HR 560 (Panetta)) to work in concert with private markets to overcome the final barrier to commercialization of these renewable energy technologies. Moreover, implementation of S 341's policies would be greatly assisted by the concurrent enactment of production tax credits.

TITLE V - COAL TECHNOLOGY

The Task Force strongly supports S 341's position on increased utilization of clean-coal technology. Coal is by far our most abundant energy resource and must play a more important part in the energy mix that makes up our base in the 21st century. While major research efforts and demonstrations are addressed in the bill, smaller-scale R&D efforts at universities which could lead to technological breakthroughs are not. Also, in all of the possible technologies related to coal, i.e. gasification and liquification, we must take care to consider the net energy required for the process.

We recommend that specific funding levels be delineated in the Coal Research, Development and Demonstration Projects, (Section 5001 of the bill), to support the acceptance of coal-based electric power plants. In addition, the export of clean-coal technology to lesser developed countries only, as stated in S 341, should be expanded to include those countries that have sounder economic bases.

TITLE VI - R, D&D & COMMERCIALIZATION

Provisions in Title VI which address research, development, demonstration and commercialization, focus on eight criteria including both applied and fundamental R&D objectives. We support these objectives: the Task Force continues to endorse additional R&D for energy production, use, and conservation. We also encourage a strong component of long-term fundamental research activity to undergird the more applied concerns which are a part of this bill. Universities and national laboratories along with private industry should be partners in these R&D activities. It is vital that the universities be involved, not only for the research contributions they can provide, but also for the educational experiences necessary for producing the next generation of technical researchers, managers, and practitioners.

Technology leadership in solar, fuel cells, fusion nuclear technologies, clean coal, oil and natural gas recovery and utilization and hydrogen fuels is also a stated goal. We support these provisions in the bill and encourage the Congress to support the necessary resource to initiate R&D in these areas.

This bill encourages the development of high-efficiency heat engines including research, development, demonstration and commercialization. While R&D emphasis is directed properly at the development of high efficiency gas turbines, we recommend that the program be broadened to include other heat engine types. It is extremely important that such an effort be accompanied by additional basic research efforts in the critical areas of basic research, such as heat transfer, materials, systems performance, and tribology.

TITLE VII, VIII, IX - PETROLEUM

The provision of a one billion barrel SPR is commendable. At the proposed fixed rate of 220,000 barrels per day, it will take about 5 years to achieve this goal. This assumes that storage space for the entire one billion barrels is available. We urge that the security provided by the SPR not be over emphasized. At the present import rate, the SPR would make up for the total loss of imports for only 125 days.

No figures are given for the oil production that is expected from the Outer Continental Shelf. The question arises as to whether open-ended leasing is to be the stated policy.

Oil and gas leasing in the Arctic National Wildlife Refuge may not be in the best interest of the country's energy policy at this time. In view of the relatively small reserves of 3.6 billion barrels (about seven months of full U.S. oil requirements), it might be better to save this oil as a long-term chemical feedstock resource. Also, the environmental protection stipulation of "no significant adverse effect" is by no means easy to comply with in the Arctic region.

TITLE XI - TRANSPORTATION AND ALTERNATIVE FUELS

S 341 recognizes the importance of establishing corporate-average fuel economy standards for automobiles and light trucks. We recommend that new standards be established and a timetable defined for their implementation so that the automotive industry can prepare and plan for the future. This must be done carefully so as not to adversely impact the industry. We suggest that the language in S 341 should encourage the establishment of target mileage goals as well as a schedule for their implementation.

Incentives for the utilization of alternative fuels should be provided as well as development of the infrastructure for making these fuels available to the public. Creating the infrastructure for refueling systems is important and requires the leadership of the federal government. In addition, more R&D is needed to determine which fuel or fuel mixture is "best" and how vehicles could best be modified for their efficient use. Additional research is also needed on alternative and hybrid vehicles.

TITLE XII, XIII, XIV - NUCLEAR ENERGY

Included in Title XII of this bill is a complete plan for needed government support for advanced reactor licensing and development, uranium enrichment development and uranium resource development. All of these efforts are necessary for an effective nuclear energy policy. Protection and encouragement are provided in S 341 for private commercial development - an enterprise in which some companies have already invested significant resources. The Task Force heartily endorses this concept which may provide the needed stimulus to get the U.S. nuclear power generation moving forward once again.

SUMMARY

It is clear that if we are to obtain our goals as stated in the NES, the future energy needs of the nation and the world must be met by a mix of energy resources. The ASME Task Force believes that, to be successful, the National Energy Strategy must be based on:

1. An aggressive strategy for initiating and sustaining energy conservation measures in the United States;

2. Enhanced cooperative efforts between the state and federal governments and industry to utilize improved and new sources of energy;

3. Incentives and regulatory actions by the federal government aimed at removing barriers to the commercialization of technologies that have the potential to contribute to our current energy base. This would include renewable energy technologies, such as solar thermal technologies;

4. The continued development of nuclear energy and re-establishment of the U.S. as a leader in technology and safety issues;

5. Enhanced investment in our future energy needs through broad based research and development.

The Task Force welcomes the opportunity to provide these recommendations and comments on S 341. We will continue to be available for response on specific issues as appropriate.

This statement expresses the views of the Task Force of the Energy Resources Group, a group of experts in the field, rather than an official position of the ASME.

CHEMICAL
MANUFACTURERS
ASSOCIATION

WRITTEN STATEMENT

OF THE

CHEMICAL MANUFACTURERS ASSOCIATION

BEFORE THE

SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

ON

S. 341, the "NATIONAL ENERGY SECURITY ACT"

APRIL 1, 1991

2501 M Street, NW 202-887-1100
Washington, D.C. 20037 Telex 89617 (CMA WSH)

The Chemical Manufacturers Association (CMA) is pleased to submit to the Senate Committee on Energy and Natural Resources the following comments on S.341, the "National Energy Security Act of 1991".

Introduction

CMA is a non-profit trade association whose member companies account for 90 percent of the productive capacity of basic industrial chemicals in the United States.

The U.S. chemical industry makes vital contributions to the growth of the U.S. economy and to the quality of the lives of American citizens. Chemical industry products are essential throughout our economy, especially to the agriculture, transportation, housing, metallurgical, health care, and clothing sectors. The chemical industry employs over one million men and women at domestic facilities throughout the country. In 1990 the chemical industry exported $39 billion worth of chemicals and related products. Net of imports, the chemical industry earned a trade surplus of $16.5 billion. This surplus was an important contribution to America's overall trade posture, which continues to be deeply in deficit.

The chemical industry is a major consumer of virtually all types of energy. In 1988, the last year for which we have complete data, the industry consumed 5.4 quadrillion Btus of energy, the equivalent of 2.55 million barrels a day of crude oil. Somewhat more than half of this energy was used for fuel and power purposes. Just under half of this energy -- about 2.5 quadrillion Btus or the equivalent of 1.17 million barrels of crude oil daily -- was used as chemical feedstocks or raw materials for industry processes. From these feedstocks the industry makes products that are further processed in plants around the country and reach consumers as pharmaceuticals, fertilizers, plastic products, clothing and carpets, automobile tires and parts, computer components, and thousands of other products.

The chemical industry is a responsible energy consumer. Over the years our companies have invested heavily in research and develoment, and in capital expenditures for new plant and equipment. We believe these expenditures are important contributors to energy efficiency improvement. Among the specific steps our companies have taken to improve their energy use efficiency are: improved production processes, improved process equipment, expanded use of cogeneration, improved insulation, capture and recycling of waste heat, and adoption of a variety of "housekeeping" measures. The results have been impressive. U.S. chemical industry energy efficiency has improved 47 percent since the recession which followed the first oil shock in late 1973.

CMA shares the opinion of the American people that economic activities should be conducted in a manner fully consistent with health, safety, and environmental concerns. CMA conducts a number of major environmental programs and our members' participation is a condition of membership in CMA. To help fulfill our environmental responsibilities, the U.S. chemical industry now spends approximately $3.4 billion annually for pollution abatement and control purposes. We also pay over $300 million annually in Superfund chemical feedstock taxes. In addition to these current expenditures, we estimate that by 1995 we will pay about $3.9 billion annually under the air toxics provisions of the recently amended Clean Air Act.

Continued access to competitively-priced energy supplies is crucial to the U.S. chemical industry's ability to compete successfully in world markets. We therefore support measures to expand energy supplies. Measures which restrict access to energy or which unilaterally raise energy costs relative to those of our foreign competitors -- such as carbon taxes, energy taxes, or oil import taxes -- weaken our international competitiveness and our ability to contribute to the strength of the American economy. We oppose such measures.

When President Bush initiated the Administration's effort to develop a National Energy Strategy in July 1989, CMA heartily endorsed his stated objective of "achieving balance among our increasing need for energy at reasonable prices, our commitment to a safer, healthier environment, our determination to maintain an economy second to none, and our goal to reduce dependence by ourselves and our friends and allies on potentially unreliable energy suppliers." Similarly, we welcomed Senator Johnston's objectives, contained in his remarks upon introducing S.341: "...We need a national energy policy that integrates the tradeoffs of energy, the economy, and the environment..."

CMA believes that a balanced approach is the correct approach and indeed the only approach to sound energy policy. There is no single conservation or efficiency measure, no single new energy source, no single research breakthrough that will attain the objectives so well stated above.

Nevertheless, CMA questions some of the proposals made in S. 341, and suggests alternate approaches. We do this on the following pages. At this point CMA would like to reiterate its great concern with one proposal in particular: The "oil security premium" contained in Title VII of S.341. CMA considers the oil security premium to be effectively a tax on imported oil and products with payment in kind, which would result in higher prices for oil and oil products. CMA has earlier conveyed to the Committee its views on this proposal. CMA remains strongly opposed to oil import restrictions in any form: tax, fee, quota, price floor or oil security premium. CMA would oppose legislation containing such a provision.

Title III - Energy Efficiency

As pointed out earlier in this statement, the chemical industry has made major improvements in its energy use efficiency since 1973. CMA member companies presently implement new energy-saving measures which satisfy their respective company's economic and financial criteria for expenditures. CMA itself annually surveys members' energy consumption to document industry performance and encourage continued improvement. CMA member comments indicate that further energy use efficiency improvement is possible, notwithstanding the large gains already achieved and notwithstanding the fact that many "easy" gains have already been realized. This further improvement is possible using readily available technology. The largest single impediment to further improvement is the capital or budget constraint facing member companies. Energy efficiency improvement projects must compete against other possible uses of company funds, and there are budget restraints to implementing all worthwhile energy efficiency projects. This leads to the conclusion that the most useful measures Congress might take to foster additional energy efficiency projects would be measures to increase the supply of capital and to lower the cost of capital to U.S. firms.

Section 3005 envisages voluntary guidelines for energy efficiency audits of industrial facilities. Many utilities already offer such services to their consumers. Given these utility services and given the considerable expertise of many industrial consumers, CMA questions the need for the additional program proposed in Section 3005.

Section 3007 envisages expanded energy use data collection by the Energy Information Administration. Although this section would require the EIA Admistrator to take data reporting burdens into account, CMA fears that any significantly expanded data colletion effort would inevitably impose significant and costly new burdens on industrial consumers, to the detriment of U.S. international competitiveness.

Section 3201 would permit State regulated utilities' investment in and expenditures for energy conservation, energy efficiency resources and other demand side management measures (not further defined) to be as profitable as investments in and expenditures for new generating facilities. CMA is concerned, first, that the cost of poorly-justified measures will ultimately fall on industrial consumers. Second, CMA sees no need for federal legislation in an area where State commissions already have the authority to institute programs such as this, when many States are already moving in this direction.

Title V - Coal, Coal Technology and Electricity

CMA supports measures to expand the use of coal in an environmentally responsible manner. The nation should utilize its most abundant energy resource.

Section 5002 envisages a plan for research, development, and demonstration with respect to technologies for non-fuel use of coal, including production of chemical intermediates that are precursors of value-added chemicals; production of chemicals from coal-derived synthetic gas; and production of coal-based chemical feedstocks. This plan would include an analysis of the costs, benefits and economic feasibility of using coal products in these and other ways. Because the chemical industry must have access to competitively priced feedstocks in order to compete successfully in world markets, good economic analysis as part of the Section 5002 plan is of crucial importance. Coal-based inputs to the chemical industry at non-competitively high prices would not be useful and would in fact be detrimental to the economy.

Section 5101 deals with the applicability of new source review to existing electric utility steam generating units, the so-called "WEPCo issue". CMA agrees with Senator Johnston's analysis of the problem caused by this issue, as recorded in his remarks upon introducing S.341. CMA welcomes efforts to devise a solution to the problem.

Title VI - Research, Development, Demonstration and Commercialization Activities

Natural gas is the chemical industry's largest single energy source. We use it both for fuel and for feedstock purposes. In many of its applications, the replacement of natural gas by other energy sources would be difficult or expensive. CMA and its members are concerned that the increased emphasis on the use of natural gas as the "environmentally preferred" fuel, or for national security reasons, may result in significant real increases in the price of natural gas, in tightness or shortages in the natural gas market, or both. Either of these would adversely affect our industry's international competitiveness.

CMA therefore believes that the "mandated" use of natural gas should be avoided. Adequate supplies and the informed choices of consumers should determine natural gas use, not government requirements. In addition, CMA believes that measures to expand the supply of natural gas are equally as important as increased emphasis on natural gas use.

Therefore, CMA welcomes Section 6004's proposed natural gas supply enhancement program for research, development and demonstration to increase the recoverable natural gas resource base.

Title VII - Strategic Petroleum Reserve

CMA considers the "oil security premium" proposed in Title VII to be in effect a tax on imported oil and products with payment in kind. CMA remains strongly opposed to oil import restrictions in any form: tax, fee, quota, price floor, or oil security premium. However, we do support an adequate Strategic Petroleum Reserve and would welcome the opportunity to work with Congress to explore other options, such as leasing, to fund this program.

Please refer to the "Written Statement of the Chemical Manufacturers Association Before the Senate Committee on Energy and Natural Resources on Title VII of S.341, the 'National Energy Security Act'", dated March 11, 1991.

Title VIII - Outer Continental Shelf

Our views on exploration and development of outer continental shelf resources are similar to our views regarding resources in the Arctic National Wildlife Refuge. We believe OCS oil and gas can continue to make important contributions to the nation's energy supply mix. We believe that exploration and development can take place in an environmentally responsible manner. And we suggest that any adverse environmental impact of OCS exploration and development must be weighed against the potential adverse environmental impact of the increased international tanker traffic to be expected in the absence of OCS exploration and development.

CMA believes that further moratoria on OCS exploration and development should be avoided and that environmentally responsible exploration and development activities in the OCS should be allowed to proceed in an orderly way.

Title IX - Oil and Gas Leasing in the Arctic National Wildlife Refuge

CMA strongly supports the stated purpose and policy of this title "...to authorize competitive oil and gas leasing and development to proceed on the Coastal Plain..." CMA supports the development of all domestic energy resources in an environmentally responsible manner. We believe enhanced energy supply must be a cornerstone of any national energy policy.

To repeat, CMA supports environmentally responsible development of energy resources. Our concern with Title IX in this respect is that Section 9401's "no significant adverse effect standard" could be interpreted or implemented so strictly as to effectively prevent oil and gas leasing and development in the Coastal Plain. We urge the Committee to ensure that the final version of S.341 makes clear that this will not be allowed to happen.

Title X - Natural Gas

As stated above in our comments on Title VI, natural gas is the chemical industry's largest single energy source. We use it both for fuel and for feedstock purposes. In many of its applications, the replacement of natural gas by other energy sources would be difficult or expensive. Access to competitively-priced natural gas is therefore crucial to the chemical industry's ability to compete successfully in world markets.

For a number of years CMA has worked to promote open-access, non-discriminatory transportation of natural gas on interstate pipelines as one means of achieving access to competitively-priced natural gas. CMA is continuing to review the complex provisions of this title to see whether they are in accord with CMA's basic goal.

Title XII - Advanced Nuclear Reactor Commercialization
Title XIII - Nuclear Reactor Licensing
Title XIV - Uranium

CMA believes an expanded role for nuclear power as one component of the nation's energy supply mix is indispensable. We believe the increased use of nuclear power is desirable both for environmental and national security reasons. And we believe nuclear power can play an expanded role in a manner which is fully consistent with the related health, saftey, and environmental concerns of the American people. CMA believes S.341's approach to this issue, addressing as it does the commercialization of advanced nuclear reactors, nuclear reactor licensing, and the need for a reliable domestic supply of uranium, constructively addresses several major issues directly relevant to the expanded use of nuclear power.

CMA respectfully suggests that the issue of nuclear waste management remains as a further vital issue that must be addressed to make the expanded use of nuclear power a reality. We urge the Committee and the Congress to address this issue directly in S.341.

Title XV - Public Utility Holding Company Act Reform

As mentioned earlier in this statement, CMA member companies have increasingly used cogeneration to provide heat and electricity. This trend has substantially contributed to the improved energy use efficiency of our industry. We have also increased our use of electricity generated by independent power producers. Our members' experience indicates, however, that a major impediment to the further expansion of both cogeneration and independent power production is lack of adequate access to the electricity transmission grid for purposes of wheeling power from the source, whether cogenerator or independent power producer, to a potential customer at a different location. CMA believes that increased access to the grid for wheeling purposes must be an integral part of efforts to increase the supply of electric power and to increase the efficiency of electricity generation in the United States.

Conclusion

The U.S. chemical industry makes vital contributions to the growth of the U.S. economy and to the quality of the lives of American citizens, as evidenced notably by the trade surplus of $16.5 billion earned by the chemical industry in 1990. The chemical industry must have continued access to competitively-priced energy and related feedstock supplies to continue to contribute to the nation's wellbeing and to maintain our international competitiveness. We therefore welcome and support measures to expand domestic energy resources, in an environmentally responsible manner. We oppose measures which will limit access to energy supplies or unilaterally raise U.S. energy costs relative to those of foreign competitors. Specifically, we oppose the oil security premium proposed in Title VII of S.341, and would oppose the bill so long as this provision remains in it.

APPENDIXES TO FEBRUARY 26, 1991 HEARING

(Title III and Subtitles A and B of Title IV)

Appendix I—Responses to Additional Questions

Department of Energy
Washington, DC 20585
April 16, 1991

The Honorable J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United State Senate
Washington, DC 20510

Dear Mr. Chairman:

On February 26, 1991, J. Michael Davis, Assistant Secretary for Conservation and Renewable Energy, testified before your committee on the Efficiency and Renewable provisions of S. 341, the National Energy Security Act.

Following the hearing, you submitted written questions on behalf of yourself and Senators Wirth and Wallop to supplement the record. Enclosed are the answers to questions (11) Wallop, (1) Wirth, and the document requested. The remaining answers are in the clearing process and will be forwarded to you as expeditiously as possible.

If we can be of further assistance to you or your staff, please contact our Congressional Hearing Coordinator, Valerie Howard, on (202) 586-2032.

Sincerely,

Joseph C. Kaupirol for

Jacqueline Knox Brown
Assistant Secretary
Congressional and Intergovernmental
Affairs

Enclosures

QUESTIONS FROM SENATOR WALLOP

Question 11: The Congress has enacted numerous environmental policies to deal with the potentially adverse impacts of our industrialized economy such as the impacts of energy production, transportation and utilization.

(a) Would you agree that existing national environmental requirements already have substantially internalized these potential environmental costs?

(b) Would you agree that for so-called "least cost" energy planning to be effective such analyses need to consider both the national security costs and benefits as well as environmental costs and benefits?

(c) What are the current limitations regarding methodologies for performing "least cost" energy planning?

Answer: (a) Yes. Legislation such as the Clean Air Act Amendments, the Clean Water Act, and the Resource Conservation and Recovery Act, among others, all impose requirements that must be borne by manufacturers and ultimately by consumers. The additional costs associated with these requirements change economic behavior and, as such, represent the internalization of many, but not all of, the environmental costs and benefits of economic activities.

(b) "Least cost" energy planning is one name for the integrated resource planning (IRP) processes currently being undertaken by many of the States. It is a process based on the premise that investments in electricity conservation and efficiency should be allowed to compete fairly with electricity supply options and that seeks to put utilities in the position of energy service providers, not just electricity generators. This will allow utilities to profit from cost-effective demand management investments, as well as from electricity generation investments.

Each State represents one experiment in how "least cost" planning might be done. Some include explicit consideration of environmental externalities in calculating which investments are cost-effective. Others do not. The Department of Energy believes that more information and analysis is needed before judgment can be passed on how "least cost" planning should address environmental and national security externalities. To that end, the Department is involved in an international effort to develop a methodology for performing full fuel cycle analyses that could be utilized in evaluating alternative energy resource options. This effort will attempt to ascertain how best to include both the costs and the benefits associated with particular energy resource options.

(c) The current limitations regarding methodologies for performing integrated resource energy planning include regulatory and other disincentives, and the difficulty in accurately measuring the costs and benefits associated with particular programs. These limitations are addressed by the NES through proposals that support State IRP activities and development of methodologies to determine the full fuel cycle costs and benefits of energy technologies. DOE plans to continue support for refinement of IRP methodologies.

QUESTIONS FROM SENATOR WIRTH

Question 1: One of the primary goals of the National Energy Strategy is to reduce oil consumption by 3.4 million barrels per day by 2010 -- largely through the use of alternative fuels. Can you break down these savings for us, and can you tell me how much of the reduced consumption is a result of passage of the Clean Air Amendments.

Answer: Of the estimated 3.4 million barrels per day oil savings in the transportation sector in 2010, about 2.2 million barrels per day are to be achieved through the use of alternative transportation fuels, and about 1.2 million barrels per day are to be obtained from transportation R&D which is expected to lead to increased vehicle and system efficiencies.

Of the 2.2 million barrels per day of oil displaced through the use of alternative fuels, we estimate that 600,000 barrels per day are due to the increased use of oxygenates resulting from the Clean Air Act Amendments of 1990 (CAAA), assuming full participation in the reformulated gasoline program. In addition, 100,000 barrels per day are due to the CAAA's California clean-fuel pilot program. The remaining 1.5 million barrels per day savings in 2010 are estimated to result from the following NES initiatives:

CAFE Credit Incentive for AF Vehicles and Alternative Fuel Fleets	1.4 mm B/D
Biomass R&D	0.1 mm B/D
Subtotal (NES Alternative Fuels)	1.5 mm B/D

QUESTIONS FROM SENATOR WIRTH

Q. Documents requested by Senator Wirth

- All DOE recommendations for the NES sent to the White House.

A. DOE did not send any recommendations for the NES to the White House. A series of options was developed by DOE working with all member Departments and Agencies of the Economic Policy Council. The Economic Policy Council considered all options analyzed by the interagency staff and held five Cabinet-level meetings, two of which were led by the President. The President made the final decisions on the NES.

DOE is preparing NES back-up analysis for publication as a series of technical annexes to the NES over the next few months. The first of these technical annexes was provided to the Committee in conjunction with the March 14, 1991 testimony of Linda Stuntz on PUHCA reform.

Department of Energy
Washington, DC 20585

April 24, 1991

The Honorable J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

On February 26, 1991, J. Michael Davis, Assistant Secretary for Conservation and Renewable Energy, testified before your committee on the Efficiency and Renewable provisions of S. 341, the National Energy Security Act.

At the time of my last letter to you dated April 16, 1991, we explained that the remaining questions for the record were not available and that they will be forwarded to you. Enclosed are the answers to those questions.

If we can be of further assistance to you or your staff, please contact our congressional hearing coordinator Valerie Howard on (202) 586-2032.

Sincerely,

Jacqueline Knox Brown
Assistant Secretary
Congressional and Intergovernmental
Affairs

Enclosures

QUESTIONS FROM COMMITTEE ON ENERGY AND NATURAL RESOURCES

Renewable Energy Joint Ventures

S. 341 contains provisions intended to promote development of commercially sound renewable energy technologies through joint ventures. This provision would expand on the joint venture program established under the Renewable Energy and Energy Efficiency Technology Competitiveness Act of 1989 (P.L. 101-218). Specifically, it would provide for new joint ventures in biomass combustion and cogeneration; fuel cells technology; geothermal energy; solar water heating technology; and biofuels energy systems. It would also provide for additional joint ventures in photovoltaic and energy systems.

Question 1: What types of projects would be likely to compete for the joint ventures in each of these areas?

Answer: Based upon the approximately 200 responses we received to a "solicitation for expressions of interest" in existing joint ventures program under P.O. 101-218 in September 1990, the projects are likely to involve many different combinations of joint venture partners. Among them would be large and small businesses, utility companies, universities, and State and local governments.

As required by P.L. 101-218, advice on the source of these joint ventures and selection criteria for projects is to be given by the Advisory Committee established under the Act. This committee is in the final stages of formation, and we plan to hold its first meeting in May.

QUESTIONS FROM COMMITTEE ON ENERGY AND NATURAL RESOURCES

Question 2: Should additional joint venture be included for other technologies; such as solar thermal for the STEPS initiative?

Answer: Our recommendation would be not to specify any particular technologies in law. Instead, we would prefer to issue solicitations for renewable energy and energy efficiency projects based on input from industry and advice from the Advisory Committee. We believe that the joint ventures created under P.L. 101-218 can be a valuable tool to improve U.S. competitiveness. Under the STEPS initiative, industry and utility teams are exploring with the Department the retrofit of Solar One at Barstow, California, with the next-generation molten-salt system. This system, to be called Solar Two, could be a precursor to sizeable utility investment for solar thermal power plants in 1995-2000. In FY 1991, the Department is proceeding to investigate design and plant specifications to meet utility scale-up needs.

QUESTIONS FROM COMMITTEE ON ENERGY AND NATURAL RESOURCES

Question 1: Are there other initiatives that should be considered by the Congress to encourage commercialization of renewable energy technologies?

Answer: During the first phase of developing the National Energy Strategy (NES), a large number of obstacles and options were identified by the public, over a period of months. This effort was reported on in detail in the National Energy Strategy Interim Report. A detailed review of the options was undertaken by a team of DOE experts from various offices, including the Office of Conservation and Renewable Energy and the Office of Policy, Planning and Analysis. The most promising of these options were then included in the NES. These options, taken together, are capable of augmenting R&D by removing market barriers to commercial introduction of renewable energy.

QUESTIONS FROM COMMITTEE ON ENERGY AND NATURAL RESOURCES

Question 2:	**What other options or initiatives were considered by the Department during the NES process.**
Answer:	As stated above, a number of renewable options identified by the public were contained in the Interim Report and were considered by the Department during the NES process. The most significant were forwarded to the Economic Policy Council for consideration. The only renewable option of those reviewed on an interagency basis which was not included in the final NES was a production incentive for certain renewable technologies. A lower cost option of extending the renewable investment tax credit was included.

QUESTIONS FROM COMMITTEE ON ENERGY AND NATURAL RESOURCES

Question 3:	What regulatory and technical barriers are there to further development and commercialization of renewable energy?
Answer:	Many renewable energy technologies are technically feasible today. That is, no scientific breakthroughs are required to develop and deploy many of these technologies, although technical and institutional barriers may limit deployment. The primary technical barrier is the need to substantially improve the economic competitiveness and performance of renewable systems. Institutional barriers include (a) burdensome regulatory requirements governing hydropower development; (b) difficulty in assuring transmission access for renewable technologies; (c) relatively high capital costs; and (d) perceived risks associated with emerging technologies.

QUESTIONS FROM COMMITTEE ON ENERGY AND NATURAL RESOURCES

Question 4: What can be done to remove these barriers?

Answer: Renewable energy technology performance can be improved and costs reduced through focused research and development. Regulatory barriers due to excessive or competition-restricting regulation can be removed as the Administration has proposed in the National Energy Strategy. Broad-based adoption of full fuel cycle analysis and integrated resource planning would encourage decision-makers to consider the benefits and costs of renewable in relation to other options.

QUESTIONS FROM COMMITTEE ON ENERGY AND NATURAL RESOURCES

Question 5: In your statement, you identify four things needed to ensure commercialization of renewable energy technologies: a stable investment climate, the opportunity to reduce R&D progress to practice, removal of market barriers, and continued focused R&D.

Do you believe that each of these issues are sufficiently addressed in the National Energy Strategy and S.341? Could more be done to address these issues?

Answer: Two prime goals of the National Energy Strategy (NES) are to maintain a strong and growing U.S. economy and to reduce dependence on potentially unreliable energy suppliers. Both goals contribute to a stable investment climate. Also needed for a stable investment climate are decisionmakers who are well informed about full fuel cycle costs and benefits of the full set of energy alternatives available. Developing a methodology for performing total fuel cycle analysis is an important component of the NES. The NES also seeks to enhance the role of technology transfer and export assistance for all renewable energy technologies. A wide set of market barriers such as the permanent removal of the 80 MW cap for small power producers under PURPA is also addressed by NES proposals. The budget request for solar and other renewables R&D for FY 1992 represents a continuation of the major expansion in FY 1991 of 42 percent over the previous appropriation. This request also responds to industry's priorities and willingness to co-fund projects that reduce R&D progress to practice. While more could always be done in an environment without constraints, I believe that the NES and our budget request aggressively address these issues.

QUESTIONS FROM COMMITTEE ON ENERGY AND NATURAL RESOURCES

Question 6: Greg Rueger of Pacific Gas & Electric outlines in his statement a number of barriers to development of renewable energy resources. Do you agree that these barriers exist? What can or should be done to remove these barriers?

Answer: Mr. Rueger cited barriers that do exist. The National Energy Strategy generally addresses these barriers to the extent that it is proper for the Federal government to do so. We will be working with utilities and independent power producers to share the good news about existing utility experience with renewables, and we will be working with utilities and other interested parties on joint ventures to gain experience with and to commercialize renewable energy systems. Total fuel cycle analysis, integrated resource planning and informational efforts should stimulate market activity for renewables which will permit cost reductions through mass production. Integrated resource planning and total fuel cycle analysis should facilitate an increasing demand for renewable options at the State and local level, and we are increasing our R&D funding for renewables. We are also increasing our efforts on joint ventures which should assist industry in overcoming investment reluctance by pooling resources.

QUESTION FROM SENATOR WIRTH

Question 2: Can you give the Committee some sense of the energy efficiency options that were not included in the National Energy Strategy? Where do the most promising opportunities lie in the building sector and industrial sector? How much energy would these options save and what would be the cost of such measures?

Answer: During the lengthy process of developing the National Energy Strategy (NES), the full range of options for improving energy efficiency were considered, including energy taxes, regulatory measures, and financial incentives. Throughout this process, options were analyzed based on the potential contribution of the various combinations or "bundles" of options to the NES's overall economic, energy security, and environmental goals. DOE, working with the Economic Policy Council (EPC), developed more detailed analyses of the most promising options. THE EPC considered the options analyzed by the interagency staff.

The final NES includes a number of measures directed at promising opportunities for improving energy efficiency in the industrial and buildings sectors. The likely energy savings and costs of these measures are summarized in the NES final report.

DOE is preparing for publication the back-up analysis of the energy efficiency and other options that were considered by the EPC. These analyses will be made available as a series of technical annexes to the NES over the next few months.

QUESTION FROM SENATOR WIRTH

Question 3: Is the Forrestal building equipped with energy efficient lighting?

Answer: The Forrestal complex was first occupied in the early 1970s. The majority of the 41,436 lighting fixtures in the building are 277-volt fluorescent type fixtures that were specifically fabricated for the building's reflected ceiling design, without regard to energy efficiency.

A lighting retrofit project for the Forrestal complex was started in 1990. In 1991, a request for proposal will be issued to install an energy-efficient lighting system in the Forrestal building using a shared energy savings contractor.

QUESTION FROM SENATOR WIRTH

Question 4: Last year I wrote amendments to the Housing Bill to improve the energy efficiency of public housing. I am pleased that the Administration has put that right out in front on the National Energy Strategy. Should we, as Senator Johnston proposes in this bill, transfer authority to make the Department of Energy the lead agency in this effort?

Answer: As one of its major energy initiatives last year, DOE has established a strong collaborative relationship with HUD to address energy efficiency opportunities not only in public housing but in other existing and new HUD housing programs. The two agencies are working together constructively, within their respective mandates.

We do not interpret the provisions of S. 341 (Johnston-Wallop) as "transferring the lead" from HUD to DOE on public housing or other issues. Section 3001 of that bill would amend the National Affordable Housing Act of 1990 to require that HUD's energy requirements for new homes financed under the National Housing Act (i.e., FHA-insured mortgages, not including manufactured homes) be at least as stringent as the DOE standards, rather than the CABO model code. Because we do not believe it would be practical to apply the DOE Standard immediately to all Federally-assisted buildings, the National Energy Strategy (NES) proposes that such buildings be required to meet cost-effective standards which, at a minimum, are equivalent to the standards currently recognized by major national organizations, such as CABO or ASHRAE.

We believe that the standards for energy efficiency and use of renewable energy for buildings financed by Federal funds should be ultimately a Federal responsibility. This will help assure that the most current technologies are considered and that the public and all other interested parties have an opportunity to be heard in a rulemaking process.

The NES would go further and require compliance with energy efficiency standards by all new construction (residential, non-residential, and manufactured housing) that is either financed with a Federally-insured home mortgage (e.g., FHA, VA, and Farmers Home Administration) or receives financial support from a Federal program.

QUESTIONS FROM SENATOR WIRTH

Question 5: Your statement before the Committee suggests support for Subtitle C of Title III of S. 341 because of its consistency with the integrated resource planning in the NES. However, you state also that the Department believes the Committee's provision goes too far and intrudes inappropriately upon the prerogatives of the States. How does the provision intrude when it does not mandate adoption, but only requires consideration?

Answer: The technical provisions of Subtitle C of Title III of S. 341 are similar to the intent of the NES to support integrated resource planning. There are two aspects of the proposed language that resulted in the Department's position. First, in Sec. 3202. (c), the bill states that the "Secretary shall consider...actions proposed by the State regulatory authority: (1) to consider implementation of the ratemaking standard established in section 111(d)(7) of the Public Utility Regulatory Policies Act of 1978." This language suggests that a State's response to the ratemaking standard will be used as a criterion for DOE's award of grants under the same section. The second concern is that in a period characterized by productive movement away from regulation, Subtitle C may open the door not only for additional regulation, but also for indirect Federal regulation of areas heretofore the sole domain of State regulatory authorities.

QUESTION FROM SENATOR SEYMOUR

Question 1: What efficiency and/or conservation measures will DOE and the Department of Housing and Urban Development undertake as pilot programs in Federally-supported housing facilities?

Answer: The overall goal of the DOE/HUD initiative is to make Federally-supported housing more affordable and comfortable through energy efficiency improvements. DOE and HUD will apply existing energy efficient technology to HUD-assisted housing construction and will retrofit some existing housing to assist in reducing Federal outlays for utility expenditures.

Through site demonstrations and training workshops, conservation measures such as heating equipment tune-up or replacement, controls, wall and ceiling insulation, infiltration reduction, and replacement of windows (when required) with efficient low-E glazing window retrofits will be encouraged.

QUESTION FROM SENATOR SEYMOUR

Question 2: Does the Department expect that the Federal government can devise workable tax incentives to make energy-saving methods attractive to rental housing owners for those units in which the tenants must pay the utility bills?

Answer: In general, we believe that tax credits are not the most efficient way to use government resources to accelerate deployment of new residential energy-saving technologies. Instead, a more cost-effective strategy combines Federal cost-shared R&D well-documented demonstrations, reliable performance data (e.g., design tools, equipment testing and labeling), and utility-sponsored rebates and other targeted private-sector incentive programs, where appropriate. Moreover, California's experience with state tax credits for solar water heating systems, in the late 1970s and early 1980s, suggested that incentives had most impact where the owner, not the tenant, paid for water heating energy.

QUESTIONS FROM SENATOR SEYMOUR

Question 3: **The NES classifies direct payments by utilities to energy-efficient consumers as subject to taxation. Does the Department therefore anticipate that utilities will expand the practice of offering tax-free rate discounts to customers as a way of preserving incentives for conservation practices?**

Answer: The NES itself does not classify direct payments as taxable; that is the IRS interpretation of the current law. The law does allow tax-free rate discounts. This distinction will be clarified in an IRS Technical Advice Memorandum called for in the National Energy Strategy to clarify the tax treatment of these programs. We do expect that utility companies will develop or modify programs consistent with that guidance in order to help reduce and improve system efficiency.

QUESTION FROM SENATOR SEYMOUR

Question 4: What steps can DOE take to correct a problem identified on page 47 of the NES: The apparent negative effects that some product efficiency standards have on the new production of energy-saving appliances?

Answer: The NES did not intend to communicate that product efficiency standards have a negative effect on the introduction of new, energy-saving appliances.

The NES states: "Appliance efficiency standards are effective in removing the least efficient models from the market, but they do little to accelerate the introduction of very efficient new models."

A mix of strategies is required. Test procedures provide a common yardstick for measuring efficiency. Standards eliminate energy-wasting products. Energy labels, information and education programs, and incentives encourage consumers to select products that exceed the standards. Research and development helps speed the introduction of more efficient products. DOE's approach attempts to blend each of these elements so that they reinforce each other and make best use of market forces.

QUESTION FROM SENATOR MALCOLM WALLOP

Question 1(a):	Would you agree that regulatory interventions into the marketplace can impose unforseen costs by reducing the flexibility of our economy and in the long-term reducing our option?
(b):	Therefore, is it not essential that government initiatives rely on free-market, economic incentives and be based on rigorous cost-benefit analyses?
Answer:	Yes. Certain regulatory interventions place unnecessary barriers to functioning of markets and they impose unforeseen cost. Therefore, following the President's guidance, the National Energy Strategy relies on free-market principles. The DOE supports this approach as the most efficient and effective mechanism for achieving our energy objectives. All options were tested using strict cost-benefit analyses based on guidelines provided by the Office of Management and Budget. We recognized, of course, that a number of factors can not easily be incorporated into precise cost-benefit analyses. Important among these are the hidden cost of regulations that constrain choice.

QUESTION FROM SENATOR MALCOLM WALLOP

Question 2(a): Would you agree that in order to be effective in promoting the most efficient use of energy, policy initiatives must rely on market forces?

(b) Would you agree that this is particularly true if integrated resources planning is to be effective in promoting energy efficiency and renewable technologies?

Answer: In this, as in all areas, our work is designed to permit market forces to operate more effectively. Our particular goal in integrated resource planning is to ensure that utilities and users are allowed to choose wisely among all investments that contribute to the delivery of energy services. This means creating a market environment where investments in conventional energy sources, renewable resources, and energy efficiency can be fairly compared and fully considered by both utilities and users. It also means identifying and removing barriers to the efficient operation of energy markets.

Question from Senator Wallop

Question 3: The Administration's National Energy Strategy contains many provisions similar to those in S. 341. In your judgment, can we merge the Administration's proposals with those in S. 341?

Answer: With regard to the many similar provisions contained in the National Energy Strategy and in S. 341, I believe the Department and Congress can work together to narrow the differences where they exist. We must note, however, that there are provisions found in S. 341 but not in the NES, and vice versa. The Department believes constructive dialogue in many of these areas is possible and could lead to the development of provisions that both the Administration and Congress find acceptable.

QUESTION FROM MALCOLM WALLOP

Question 4: The Administration has estimated that energy demand and supply initiatives can achieve comparable benefits under a balanced national energy strategy. By the year 2000, oil consumption can be reduced by 1.3 million barrels per day and domestic oil production can be increased by 1.8 million barrels per day. By the year 2010, oil consumption can be reduced by 3.4 million barrels per day and domestic oil production can be increased by 3.8 million barrels per day.

Answer: A balanced energy strategy is needed that fosters both improved energy efficiency and increased domestic energy production. While important elements of the National Energy Strategy, energy efficiency and renewable energy alone cannot meet our future energy needs. The Administration's National Energy Strategy presents a balanced program of greater energy efficiency, use of alternative fuels, and responsible development of all U.S. energy sources including Arctic National Wildlife Refuge.

QUESTIONS FROM SENATOR WALLOP

Question 5a. While some other countries are doing better than the United States in this regard, would you agree that we must examine the reasons for the differences that exist in energy consumption per unit of Gross National Project?

Answer: The Energy Information Administration (EIA) has completed a study of this subject, and it is summarized in the attached report entitled "Indicators of Energy Efficiency: An International Comparison."

Committee Note--The material submitted has been retained in Committee files.

QUESTIONS FROM SENATOR WALLOP

Question 5b.	In some countries, such as Japan and Europe, energy consumption patterns are influenced by government trade and balance-of-payment policies. Often taxes are imposed on energy supplies such as gasoline in order to reduce energy demand or foster energy conservation. Would you agree that energy consumption per unit of GNP is influenced by price?
Answer:	Yes, I would agree that energy use per unit of GNP is influenced by price. But, price is only one of many factors influencing energy use per unit of GNP. As the Energy Information Administration's Service Report, Indicators of Energy Efficiency: An International Comparison indicates, even though gasoline prices (including taxes) in the United States are less than half of those in many of the other G-7 countries and the United States emission and auto safety standards are much more demanding, new car fuel economy in the United States is roughly equivalent to that in the other G-7 countries. I must also point out that while higher energy prices imposed by increased taxes serve to increase efficiency, an increase in the gasoline tax would have to be extremely high to have a significant affect on consumption. For example, a 10 cents per gallon tax on motor fuels (motor gasoline and highway diesel) would reduce motor fuels consumption by only 50,000 barrels of oil per day in the first year, while a 50 cents

per gallon tax would reduce consumption by 230,000 barrels of oil per day in the first year of the tax increase. Higher gasoline taxes would also reduce consumer well being if not offset by reductions in taxes elsewhere. A 50 cents per gallon tax would reduce real GNP by $20 billion (in 1982 dollars) in the first year of the tax, assuming no compensating change in fiscal or monetary policy occurs. In addition, gasoline taxes are regressive in nature, in other words, the burden in terms of percent of income devoted to these taxes is typically greater for the lower income segments of the population. For a 50 cents gas tax, families earning less than $10,000 would lose almost five percent of their income while families earning more than $50,000 would lose one percent of their income.

QUESTIONS FROM SENATOR WALLOP

Question 5c.	Then there are those countries which effectively import all their energy, such as Japan. In such instances, energy consumption per unit of GNP would be reduced compared to the United States because such countries would not incur any energy production costs, would you agree?
Answer:	Yes, although compared to other factors such as geography, climate, energy prices and composition of the industrial sector, the difference in energy consumed between a nation which effectively imports all its energy and a nation which produces a substantial portion of its energy does not materially affect energy use per unit of GNP.

QUESTION FROM SENATOR WALLOP

Question 6a: This bill contains several provisions relating to energy efficiency guidelines for both new and existing housing. While I have no objection to the development of voluntary guidelines in this area, I am very concerned about the direction that the Administration and the Congress seem to be taking toward making these guidelines mandatory.

Last year's Cranston/Gonzales Affordable Housing Act required the development of energy efficiency standards for new construction in order to be eligible for FHA mortgages. In your view, are such conditions necessary or desirable?

Answer: The National Energy Strategy (NES) supports the provision in the National Affordable Housing Act requiring that energy efficiency standards be met in order for new construction to be eligible for FHA mortgages. The NES proposes that: "All new buildings subsidized by Federal funds or Federally-insured mortgages will be required to meet cost-effective, energy-efficiency standards, which, at the minimum, are equivalent to the standards or codes currently recognized by major national organizations."

Traditionally, new housing has been subject to State and local building codes, which for the last ten years have included energy efficiency requirements. The Federal government has established standards for both Federally-owned and Federally-assisted new housing. With respect to FHA-insured housing, these requirements are reflected in Minimum Property Standards (MPS) issued by the Department of Housing and Urban Development (HUD).

While the Administration remains opposed to the imposition of mandatory Federal standards in most areas, standards for Federally-assisted new housing have been long recognized as an appropriate Government responsibility. The NES calls on Federal agencies to update their existing standards to reflect, at a minimum, the requirements that are already recognized by the national organizations responsible for the development of such standards.

QUESTION FROM SENATOR WALLOP

Question 6b: What effect will this requirement have on the private mortgage market?

Answer: The effect on private mortgages will be minor. Most new construction already exceeds the HUD Minimum Property Standards (MPS) applied to new FHA-insured housing. Where the requirement leads to more energy-efficient housing, there could be a very small increase in the initial cost of such housing, which would be more than offset by the resulting energy cost savings.

Question 6c: What effect will the approach have on the building industry?

Answer: The overall effect on the building industry should be positive. The only possible adverse effects might result from the possible increases in the initial price of homes. Even minor increases (e.g., 1-2%) might discourage some potential buyers unless mortgage terms are adjusted to take account of the reduced utility bills. DOE has initiated a collaborative program with the National Association of Home Builders and others to get voluntary, national recognition of energy-efficient mortgages to address such possible adverse effects. Under the National Energy Strategy (NES) these efforts will be expanded.

QUESTION FROM SENATOR WALLOP

Question 7a: With respect to energy efficiency ratings for existing housing, has DOE or any other Federal agency proposed that a Federally-insured mortgage be conditioned on the receipt of a minimum rating for the property to be mortgaged?

Answer: DOE has not proposed that a Federally-insured mortgage be conditioned on the receipt of a minimum rating for the property to be mortgaged. We know of no such proposal and would oppose such a proposal. However, the National Energy Strategy (NES) does recognize the importance of making available to all prospective buyers information on the energy efficiency of both new and existing homes. Normally, such information is provided by an energy rating.

Question 7b: If such a condition were imposed, what alternatives would be available to the seller of a home that did not meet the minimum rating requirement?

Answer: The question is academic, since this hasn't been proposed. However, if this were imposed, the seller would be required to upgrade his or her house before it could receive a Federally-guaranteed mortgage. As stated above, DOE would oppose such a proposal.

QUESTION FROM SENATOR WALLOP

Question 7c.	What effect would imposition of this kind of condition have on the resale housing market?
Answer:	The imposition of this kind of condition would have an adverse impact on homeowners seeking to sell their homes if the homes were not to receive the minimum rating. Although they may be able to obtain loans to upgrade their homes to obtain the minimum rating, this would take time and effort which could be a burden, particularly for elderly homeowners. Therefore, DOE is not proposing the imposition of this kind of condition. DOE is proposing that a home energy rating be available on these homes, but this would not affect the availability of an FHA loan on an existing home. The rating would inform the buyer of the measures that could be taken to improve the home's energy efficiency. DOE is working with primary lenders and the secondary mortgage institutions to enable the home buyer to increase the size of his or her mortgage to install these energy-saving measures. We believe the availability of rating systems and mortgage financing will benefit both the home seller and the buyer.

QUESTIONS FROM SENATOR WALLOP

LEAST-COST PLANNING QUESTIONS FOR DOE

Question 8: How does "least cost" planning differ from "life-cycle" costing of energy alternatives?

Answer: Least cost planning, which is now generally known as integrated resource planning, or IRP, is a process in which all energy alternatives, both supply and demand-side, are identified and evaluated in terms of their ability to meet the energy needs of the market in the most cost-effective manner. In addition to investments in traditional supply technologies, the alternatives include reducing customer demand, saving energy through efficiency improvements, encouraging customer cogeneration, and investing in new supply technologies such as renewable energy systems. IRP relies on a diverse set of analytical tools, of which life-cycle costing is one. Life-cycle costing is a methodology that addresses all appropriate economic factors and discounts future costs and benefits to a present value, thereby allowing for comparisons of different time-phased alternatives.

QUESTIONS FROM SENATOR WALLOP

Least cost planning requires that assumptions be made regarding interest rates, the life of a proposed facility, fuel prices, maintenance costs and so on.

Question 9a: It would appear that such calculations would favor technologies with low capital costs (such as gas-fired turbines) over longer-lived capital intensive facilities (such as coal and nuclear facilities). Would you comment?

Answer: Least cost planning, or Integrated Resource Planning, do not intrinsically favor technologies with low capital costs. The calculations you describe are important elements of life cycle costing analyses, which should be a critical part of any investment decision. Life-cycle costing accounts for all costs and benefits over the life of the facility and discounts future streams of expenditures and benefits to develop a net present value. This process tends to give added weight to near term costs in comparison to later costs that are discounted over a longer time period. Life-cycle costing differs from costing methods that are based only on capital costs and provides for consideration of operating, maintenance and repair costs and long-term fuel costs. Because it provides a fair economic comparison of alternatives, it is the preferred method of comparing capital intensive technologies to fuel intensive technologies. Generally, it is the shorter planning and construction horizons--for example, less than 2 years for gas turbines versus 10 years or more for large coal or nuclear facilities--and the concomitant reduction in investment risks that can lead decisionmakers to a preference for the less capital intensive technologies.

QUESTIONS FROM SENATOR WALLOP

Question 9b:	It would appear that least-cost planning would provide an economic premium to demand reduction and energy conservation measures, and perhaps off-system power purchases, rather than the construction of new base-load power plants. Would you comment?
Answer:	IRP, or least cost utility planning, does not inherently provide an economic premium to favor certain energy options, but rather seeks to reflect an accurate accounting of all costs and benefits associated with each option. We expect that when IRP is employed properly, energy efficiency and demand reduction will be preferred options only when they are the least cost alternatives.

QUESTIONS FROM SENATOR WALLOP

Question 10a: There are those who advocate that "least cost" planning should include so-called "environmental externalities", what ever that concept includes. If I am not mistaken, "least cost" planning already includes the costs of environmental controls. Would you agree?

Answer: The market prices resulting from least-cost planning would normally include all of the costs of the environmental controls in effect at the time. The concept of externalities refers to those costs not now captured in the price system such as emissions that are within permissible limits but which may have environmental or health impacts. Several States have initiated planning processes that attempt to account for certain "external costs" using a variety of proxies, but no broadly accepted standard approach currently exists.

QUESTIONS FROM SENATOR WALLOP

Question 10b: To the extent that any "least cost" planning includes externalities, should it not also include national security costs, such as those associated with maintaining a military presence in the Middle-east? What other externalities should be considered?

Answer: The Department of Energy believes that more information is needed before we can determine whether integrated resource planning should include both environmental and national security costs and benefits, and if so, how. To that end the Department is involved in an international effort to develop a methodology for performing total fuel cycle analyses that could be utilized in evaluating alternative energy resource options.

The DOE study will address, to the extent feasible, security costs and other externalities, as yet undefined, that can be properly quantified and attributed to the total cost of fuel cycles.

QUESTIONS FROM SENATOR WALLOP

The Congress has enacted numerous environmental policies to deal with the potentially adverse impacts of our industrialized economy such as the impacts of energy production, transportation and utilization.

Question 11a: Would you agree that existing national environmental requirements already have substantially internalized these potential environmental costs?

Answer: Yes. Legislation including the Clean Air Act Amendments, the Clean Water Act, and the Resources Conservation and Recovery Act, among others, all impose requirements that must be borne by manufacturers and ultimately by consumers. The additional costs associated with these requirements change economic behavior and, as such, represent the internalization of environmental costs and benefits.

QUESTIONS FROM SENATOR WALLOP

Question 11b: Would you agree that for so called "least cost" energy planning to be effective such analysis need to consider both the national security costs and benefits as well as any environmental costs and benefits?

Answer: We agree that national security implications need to be considered along with environmental impacts when making energy service decisions. However, the costs and benefits associated with these factors are extremely difficult to measure. Existing methods to estimate these costs and benefits are inadequate. DOE and other parties are undertaking analysis to improve these methods.

Question 11c: What are the current limitations regarding methodologies for performing "least cost" energy planning?

Answer: The current limitations regarding methodologies for performing integrated resource energy planning include regulatory and other disincentives, and the difficulty in accurately measuring the costs and benefits associated with particular programs. These limitations are addressed by the NES through proposals that support State IRP activities and development of methodologies to determine the total fuel cycle costs and benefits of energy technologies. DOE plans to expand support for refinement of IRP methodologies.

Question from Senator Wallop

Question 12 (a): Would you agree that the advancement of new energy supplies and technologies must serve as a critical component in the growth of the United States economy?

Answer: Yes, I would agree that advancement of new energy supplies and technologies (both supply and end-use efficiency technologies) is critical to the continued growth and vitality of the United States economy, provided that these technologies are cost competitive, efficient, reliable, and meet national environmental objectives. We believe that the technologies supported within the FY 1992 request meet these objectives.

Question 12(b): Would you also agree that the commercialization of new energy technologies can serve to reduce our energy related trade balance?

Answer: Commercialization of new technologies, if economically competitive, will help reduce our energy-related trade balance to the extent they reduce the need for energy imports.

Question from Senator Wallop

Question 13: Would you agree that there is a need to streamline or remove certain regulatory procedural barriers that unreasonably constrain the deployment of new, advanced renewable and energy efficiency technologies?

Answer: Yes. Ultimately, advanced energy products must be able to compete within the marketplace. To the extent that regulatory, information, or institutional barriers exist to achieving competitive markets, they should be identified and removed or streamlined. The National Energy Strategy (NES) has identified and proposed remedies for a number of regulatory barriers that impede greater use of renewable and efficiency technology. The NES regulatory reforms include amendment of the Federal Power Act to reform hydropower licensing; amendment of PURPA to remove permanently size limitations on renewable projects and relax co-firing limits: and amendment of PUHCA to allow greater technology competition for new power producers.

QUESTIONS FROM SENATOR AKAKA

Question 1: Mr. Davis, during my questions to you earlier in the hearing, you promised to provide the details of the types of biomass technologies that were considered for potential eligibility under the reference to changes in the 10 percent tax credit which appears on page 119 of the National Energy Strategy. Insert this information at this point in the record:

Answer: Two types of biomass technologies that produce electricity were considered -- those using dedicated energy feedstocks and those using advanced conversion technologies. The former would include biomass-electric power plants which used as fuel only feedstocks that are grown exclusively for energy purposes on a sustaining basis. Such "biomass energy farms" are almost non-existent today, but the technology is advancing and is nearing commercialization. The latter would include biomass-electric power plants which use a conversion technology with a heat rate of less than 11,000 Btu/kWh. Biomass generators with this efficiency are not commercial today, but development of biomass gasifier and turbine technologies is advancing with prototype demonstrations planned for the next few years. There are other biomass electric technologies which are already commercial and therefore do not need an incentive.

QUESTIONS FROM SENATOR AKAKA

Question 2:	**Mr. Davis, do you agree or disagree with the statement that if incentives are to be offered for renewable technologies, it is often better to offer an incentive that promotes energy production -- such as a production tax credit -- rather than merely promote the acquisition of capital assets?**
Answer:	Both investment tax credits and production tax credits provide a more certain and immediate incentive to a potential investor, and thus are more effective at stimulating investment than are production tax credits, for which the investor must await energy production before receiving the credits. On the other hand, production tax credits provide an incentive directly for the desired result, renewable energy production. They also stimulate technology quality because systems which produce more energy receive greater incentives, but they can be costly. They also discourage the possibility of abuse in the form of credits paid for systems that operate poorly or not at all.

QUESTIONS FROM SENATOR AKAKA

Question 3: Identify any studies that the department has completed or has in progress which analyze the high up front capital costs of renewable technologies or which analyze possible methods of long-term financing assistance.

Answer: The department has no such studies completed or underway.

QUESTIONS FROM SENATOR AKAKA

ELECTRIC VEHICLES

The Department clearly has a general authorization to perform electric vehicle research. But I am concerned about whether you have the authority to carry out an electric vehicle program at the level of $27 million provided for in the fiscal year 1992 budget or the 4 year total of $150 million proposed in the White House fact sheet of February 20 regarding the National Energy Strategy.

Question 4: Mr. Davis, cite all legislative authority that the Department will rely on for an appropriation of $27 million in fiscal year 1992 or the four year level of $150 million.

Answer: P.L. 94-413, the Electric and Hybrid Vehicle Research, Development, and Demonstration Act of 1976, as amended by P.L. 95-238, Title VI, authorizes a program in the Department to promote electric vehicle technologies and to demonstrate the commercial feasibility of electric vehicles. $160 million was authorized to be appropriated through FY 1981 to carry out the provisions of this Act. Appropriation of funds beyond FY 1981 must be authorized in annual authorization Acts. Sec. 6(b)(3) of P.L. 93-577, the Federal Nonnuclear Energy Research and Development Act of 1974, also authorizes the Department to advance energy conservation technologies, e.g., improvements in automobile design for increased efficiency and lowered emissions, including investigation of the full range of alternatives to the internal combustion engine. Appropriation of funds to carry out the purposes of this Act must be authorized in annual authorization Acts. P.L. 100-218 authorizes $71 million in FY 1992 for a transportation program which includes battery research and development, but this authorized level is below the $111.2 million FY 1992 budget request.

QUESTIONS FROM SENATOR AKAKA

ELECTRIC VEHICLES

Question 5: Mr. Davis, what is the specific statutory authority authorizing an appropriation of $27 million in fiscal year 1992 or $150 over four years? Also state what the ceiling on appropriations would be under this statutory authority.

Answer: Although Sec. 5 of P.L. 100-218, the Renewable Energy and Energy Efficiency Technology Competition Act of 1989, authorizes $71 million in FY 1992 for a transportation program which includes battery research and development, this authorized level is below the $111.2 million FY 1992 budget request. Under this Act, the authorization ceiling for the three-year period from FY 1991 to FY 1993 is $213.2 million. No other specific statutory authority presently exists to support an electric vehicle battery R&D program at the level of $27 million in FY 1992 nor the 4-year total of $150 million. However, we have authority to proceed under P.L. 93-577, which authorizes the Department to advance energy conservation technologies, e.g., improvements in automobile design for increased efficiency and lowered emissions, including investigation of the full range of alternatives to the internal combustion engine; and under P.L. 94-413, as amended, which authorizes a program in the Department to promote electric vehicle technologies and to demonstrate the commercial feasibility of electric vehicles.

QUESTIONS FROM SENATOR AKAKA

ELECTRIC VEHICLES

Question 6: Mr. Davis, what types of batteries do you believe show the greatest promise for electric vehicles? Why do you believe this is so?

Answer: The ultimate battery for an electric vehicle would be one that would provide the customer with performance and cost comparable to conventional gasoline-powered vehicles. To achieve this, the battery must have very high energy per unit weight, high power over hundreds of charge/discharge cycles, and moderate cost. There are many other vehicle-related factors that also are important, including safety, high reliability, low specific volume, low maintenance requirements, absence of toxic materials, etc. Although it is not yet clear which battery system is optimum for all of these criteria, those that offer the greatest potential include: sodium-sulfur, sodium-metal chloride, lithium-metal sulfide, and lithium polymer. These choices have been determined through analysis of the results of research and development to date on a wide variety of battery systems.

QUESTIONS FROM SENATOR AKAKA

ELECTRIC VEHICLES

Question 7: Mr. Davis, what types of battery development research will be performed under your FY 1992 appropriation. List specific amounts allocated to each research activity.

Answer: In FY 1992 the Department plans to support battery research and development through a cooperative agreement with the United States Advanced Battery Consortium (USABC) recently formed by the three major automotive manufacturers. Although specific battery candidates and funding allocations by the consortium have not been finalized to date, sodium-sulfur, lithium-metal sulfide, and lithium polymer have been identified as batteries with the potential for satisfying their requirements. We expect the USABC to submit a formal proposal to the Department during April of this year which will include specific funding requirements for the battery systems proposed.

QUESTIONS FROM SENATOR AKAKA

Integration of Renewable Energy with Conventional Power Systems

Question 8: One problem common to all of the renewable technologies that serves as a barrier to their more widespread utilization is the integration of renewables into the utility grid. With the exception of biomass and geothermal, renewable technologies depend upon whether the sun shines or the wind blows.

Many utilities are concerned about the heavy reliance on intermittent sources of renewable energy because of the problems of meeting their customer needs for steady power.

Mr. Davis, what can be done to help the nation's utilities overcome this concern?

Answer: First, we need to recognize that only a subset of renewables are intermittent or non-dispatchable. The bulk of the renewable energy which is used today comes from hydro, biomass and geothermal. On an annual basis these options supply almost 3.9 quads of primary energy. The intermittent or non-dispatchable sources include wind, solar thermal, and photovoltaics, and these supply roughly 0.1 quads: 1500 MW from wind, 354 MW from solar thermal, and 20 MW from photovoltaics. Renewables have been integrated successfully into major power systems and are operating reliably. Utilities are beginning to include these renewables into their planning process just as they are including demand-side options in planning. It is true that the wind does not always blow and the sun does not always shine. However, the NES options to remove permanently the 80 MW cap on small power producers and to expand the co-firing limit to 50 percent would permit renewable systems to be tied with fossil-fueled options to provide firm power or to reduce the load swings associated with storm fronts and sudden renewable outages.

Careful management of the hydro resource is also essential because of the variability of stream flow. Utilities have learned how to cope successfully with this variability. The potential intermittency of wind and solar sources has not been a major problem to date because the development has occurred in regions with excellent resources, e.g. California and Hawaii, and these sources have not been a dominant portion of the host utility mix. Coordination of hydro resources, which are usually limited in energy and often have excess capacity, with wind and solar resources which are subject to intermittency, provides an opportunity to firm up the intermittent resources and extend the hydro resources. Thus, the coordinated system would be more cost-effective. In addition to conventional hydro, pumped hydro and other energy storage R&D programs also provide the opportunity to address the intermittency concern.

QUESTIONS FROM SENATOR AKAKA

Question 9: Mr. Davis, do you believe that there would be benefits to initiating research and analysis on renewable energy integration problems as part of the National Energy Strategy?

Answer: We are paying considerable attention to integration issues, not just for renewables but for the whole spectrum of demand- and supply-side options as the nation's power systems become more market oriented. The Office of Conservation and Renewable Energy has an active power system reliability program addressing renewable electricity system integration issues, which complements our integrated resource planning and renewables R&D programs. Our reliability program addresses whether changes in power system design and protection are necessary to accommodate systems designed without considering renewable and other dispersed generators.

Question 10: What work do you currently have underway to address these problems?

Answer: First, we are working with utilities to promote success stories about the performance of existing renewable options. Second, we are working with them to identify models and data which they need to make renewable investment decisions and to develop operating strategies. Finally, we are investigating how to improve the efficiency, reliability and flexibility of the power system.

QUESTION FROM SENATOR AKAKA

Question 11: Mr. Davis, describe the regional biofuels program and identify whether Hawaii is included within one of the DOE regional organizations.

Answer: I am providing you with a brochure which describes the Regional Biomass Energy Program. Hawaii is not participating in the program at this time. However, the Department has for several years been directed to provide support for similar activities managed by the Hawaii Natural Energy Institute. In FY 1991, the Committee recommended $750,000 for this purpose.

QUESTION FROM SENATOR AKAKA

Question 12: What is the amount available in FY 1991 and FY 1992 for this program [the Regional Biomass Energy Program], by region?

Answer: We are currently reviewing the basis for allocating the appropriation among the regions and headquarters support activities. The objectives of the Regional Biomass Energy Program (RBEP) are resource assessment, industry support, technology transfer and matching of local resources to conversion technologies. In order to arrive at a reasonable rationale for the allocation, we are considering factors such as population, resource availability, fuel prices, and industry cost-sharing. At this time no decisions have been made concerning either the FY 1991 appropriation of $4,444,000 or the FY 1992 request of $2,000,000. As a point of reference, the FY 1990 appropriation was divided as follows:

REGION	AMOUNT
Northeast	$600,000
Southeast	$910,000
Great Lakes	$500,000
Western	$710,000
Northwest	$740,000
Headquarters	$299,000
Total	$3,759,000

QUESTIONS FROM SENATOR AKAKA

FY 1990-91 APPROPRIATIONS

Question 13: Mr. Davis, the FY 1990 appropriation for biofuels energy systems contained $500,000 to continue the Hawaii biofuels program at the Hawaii National Energy Institute (HNEI).

With respect to this $500,000 appropriation, identify: (1) amounts (list specific dollar amount) received by HNEI, (2) amounts received by entities other than HNEI, and (3) amounts yet to be disbursed to HNEI or entities other than HNEI from this appropriation. Identify each dollar amount, list the date of each disbursement, and the specific research activities to be performed.

Answer: HNEI has had difficulty in developing a specific scope of work for activities to be accomplished utilizing FY 1990 funding. In order to properly address this issue, HNEI requested a no-cost extension to their FY 1989 contract to March 31, 1991. The new scope of work will be in place by then, and FY 1990 funds will be forwarded to HNEI on April 1, 1991.

The HNEI work is managed and administered by the Solar Energy Research Institute (SERI). Of the $500,000 appropriated in FY 1990, $424,000 was transferred to SERI from DOE headquarters in March of 1990. SERI management and administrative overhead will amount to $84,000.

The research activities to be included under the FY 1990 scope of work include investigations of biomass systems integration and economics, which will cover both energy crops production and conversion to fuels and other high value co-products. A continuing and expanded scope of work is being developed for the FY 1991 appropriation of $750,000 which is scheduled for completion in August 1991.

QUESTIONS FROM SENATOR AKAKA

Question 14: Mr. Davis, the FY 1990 appropriation for ocean energy systems contains $4,178,000 "to continue the PICHTR-OTEC project. Not less than $2,100,000 of the PICHTR-OTEC funds shall be made available directly to the organization established by the State of Hawaii pursuant to Section 3 of Act 152 of the 1983 Hawaii Legislative Session." Based upon this appropriations language, identify amounts that has been, or will be disbursed to PICHTR, listing the specific research activities to be performed.

Answer: PICHTR received $2,048,000 through the Solar Energy Research Institute; this represents the $2,100,000 appropriated less proportional reductions for Gramm-Rudman, the general reduction, Small Business Innovative Research, and reserves. PICHTR used these funds to complete the preliminary and final designs of the 165 kWe OTEC experiment and for the operation of the test fixtures located at Natural Energy Laboratory of Hawaii referred to as the SeaCoast Test Facility.

QUESTIONS FROM SENATOR AKAKA

Question 15: Mr. Davis, identify amounts that will be disbursed to entities other than PICHTR from this appropriation, listing the specific dollar amounts and research to be performed.

Answer: For FY 1990, a total of $1,306,000 was disbursed to the Solar Energy Research Institute (SERI), not including the funds for PICHTR which were contracted through SERI. At SERI, $920,000 was used for analytical support of the design and system development for the planned 165 kWe OTEC experiment, and $386,000 was used to complete testing of heat and mass transfer processes using seawater at the Natural Energy Laboratory of Hawaii, also in support of the experiment. At Argonne National Laboratory, $200,000 was provided to complete validation of open-cycle OTEC analytical models in support of the design of the 165kWe OTEC experiment. Remaining funds were retained at DOE headquarters for planning, Small Business Innovative Research, and reserves.

QUESTIONS FROM SENATOR AKAKA

Question 16: Mr. Davis, the FY 1991 appropriations for ocean energy systems contains $2,750,00 "for the PICHTR-OTEC project. Not less than $2,250,000 of the PICHTR-OTEC funds shall be made available directly to the organization established by the State of Hawaii pursuant to Section 3 of Act 152 of the 1983 Hawaii Legislative Session." Based upon this appropriations language, identify amounts that the department will disburse to PICHTR, listing the specific research activities to be performed.

Answer: We are currently processing funding actions which will include the $2,250,000 appropriated for PICHTR less proportional reductions for Small Business Innovative Research, the general reduction applied to all renewable energy programs, similar requirements, and reserves. In the event the reserves are not required, they will be allocated to PICHTR for the 165 kWe OTEC experiment. PICHTR has responsibility for the construction and acceptance testing of the 165 kWe OTEC experiment to be performed at Natural Energy Laboratory of Hawaii.

QUESTIONS FROM SENATOR AKAKA

Question 17: Mr. Davis, identify amounts that will be disbursed to entities other than PICHTR from this appropriation, listing the specific dollar amounts and research to be performed.

Answer: The remaining $500,000 in the FY 1991 ocean energy systems appropriation will be retained at DOE headquarters for planning, Small Business Innovative Research, and reserves. In the event the reserves are not required, they will be allocated to PICHTR for the 165 kWe OTEC experiment.

QUESTIONS FROM SENATOR BINGAMAM

Question 1: In your opinion, which renewable energy technologies have the greatest potential to contribute to improving our energy situation in the next decade, considering maturity of the technology as well as the capital investments and infrastructure necessary to make it viable in the marketplace?

Answer: The renewable technologies currently contributing most to our energy economy are hydropower and wood burning, which provide about 3 quads of primary energy each on an annual basis. Geothermal, active and passive solar, and wind energy systems each provide a fraction of a quad annually. The contributions of all of these technologies will continue to grow over the next decade. Indeed, one of our most important conclusions from the National Energy Strategy (NES) studies is that the contribution of renewables has been growing and will continue to grow in the foreseeable future. Our budget is carefully tailored to reflect the priorities which the NES process identified. Furthermore, it reflects a shift to more short- and medium-term R&D with the express goal of making these technologies competitive in the marketplace without subsidies.

Within the next decade, we see hydropower, geothermal, biomass, and municipal solid waste-to-energy systems as providing the largest renewable energy contribution increments. These will be stimulated by hydropower regulatory reform, the extension of the solar and geothermal investment tax credit, and the waste-to-energy (WTE) initiatives included in the NES. Solar water heating, active/passive solar systems, and daylighting systems are competitive in many markets today, and their market share will also continue to expand over the next decade. Wind and solar thermal electric (parabolic trough) technologies have begun to compete in the electricity economy, especially in California, and their contributions are expected to grow steadily and to expand to other regions with good wind and solar resources. Photovoltaic (PV) systems are successfully serving off-grid power applications today. While PV systems are not expected to contribute significantly to the utility grid in this decade, the current markets for PV are growing and will support the continued development of this technology to the point that it an provide grid power beyond 2000.

QUESTIONS FROM SENATOR BINGAMAN

Question 2: What will it take to make the various renewable energy technologies competitive with fossil fuels?

Answer: Hydroelectric systems are already cost-competitive with fossil fuel-fired power plants. Significantly increasing the contribution from hydro depends on the regulatory reform proposed in the National Energy Strategy (NES).

Some industrial and municipal waste-to-energy (WTE) technologies are also competing in the energy marketplace at the present time, particularly where alternative disposal technologies are expensive. Further commercialization is being delayed by regulatory, permitting and siting issues. For example, EPA regulations require that municipal solid waste combustors be cleaner than their coal or oil counterparts in terms of criteria pollutants. Also, research indicates that the concentration of heavy metals in leachate from actual landfills is considerably lower than concentrations determined by EPA-prescribed regulatory tests. The waste-to-energy initiative in the NES calls for additional R&D to develop better waste handling and conversion systems which provide environmentally acceptable solutions for toxicity and ash disposal issues, and for development and dissemination of accurate information on WTE technologies so that informed deployment decisions can be made.

Today, there exists an ethanol-from-grain industry that produces approximately 850 million gallons of alcohol fuel annually, but relies heavily on tax subsidies to be competitive. The Department is currently undertaking an initiative to make ethanol transportation fuels from cellulosic feedstocks competitive without these tax subsidies. This initiative will lay the foundations for the commercial development of an alternative transportation fuel industry which can compete with fossil-derived fuels.

The competitiveness of other renewable technologies can be speeded up by accelerating development of these technologies through increased R&D programs conducted on a collaborative, cost-shared basis with industry to facilitate technology transfer to the private sector. We believe this is critical to their successful and timely development and have included increased renewables R&D in NES.

Other NES initiatives, such as removal of regulatory barriers in electricity-generation, development of comparative methodologies for total fuel cycle analysis, and support for integrated resource planning, will also improve the competitiveness of renewable technologies.

QUESTIONS FROM SENATOR BINGAMAN

Question 3: Renewable energy must play a critical role in achieving energy security, but the Administration shows no commitment to pursuing the relevant technologies looking at the DOE budget. Moreover, the DOE national laboratories play an important role in the research and development of renewable technologies and that role could be expanded. Given the contributions to the environmental quality and energy security that are possible with renewable energies, shouldn't the R&D efforts in these areas be expanded, even at the expense of other energy R&D areas?

Answer: Intensified R&D efforts in renewable energy are important elements of the National Energy Strategy (NES). We support continued, focused R&D in critical areas to realize the full potential of these technologies. We also support the use of collaborative R&D programs involving the National Laboratories working closely with industry to leverage government spending in the development of these technologies. The Cooperative Research and Development Agreements (CRADAs) that were established by Congress under P.L. 101-189 offer an excellent mechanism for increased collaboration, and the laboratories are rapidly establishing CRADA projects with industry in a variety of areas including renewable energy.

Setting R&D funding priorities for different energy technologies is a very broad issue that we will continue to address. We believe the current budget request, which is consistent with the NES, represents a balanced and fiscally responsible allocation of funding for energy R&D. Indeed, the FY 1992 request represents a 79 percent increase over our FY 1990 request for renewable energy R&D. We believe this demonstrates serious commitment to these technologies.

Pacific Gas and Electric Company

Washington, DC Office
1726 M Street, Northwest, Suite 1100
Washington, DC 20036-4502
202/466-7980
Panafax 202/296-5057

PG&E

March 22, 1991

Hon. J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, D. C. 20510

Dear Mr. Chairman:

Enclosed are answers to questions submitted for the record to Mr. Gregory M. Rueger, Sr. Vice President and General Manager-Electric Supply, of Pacific Gas and Electric Company in conjunction with the hearing held on February 26, 1991.

Thank you very much for your consideration.

Sincerely,

Thomas M. Hill

Thomas M. Hill
Director, Federal Legislative Relations

TMH:acr

cc: Hon. Malcolm Wallop
Ranking Minority Member

Enclosure

U.S. Senate Committee on Energy Regulation and Conservation

QUESTIONS FOR MR. GREGORY RUEGER (PG&E)
Regarding February 26, 1990, Testimony on S. 341

Re: Federal role

1) On page 5 of your testimony, you suggest that the best role for the Federal government is in information, research and where appropriate, standards, while you suggest utilities are better suited to provide financial assistance and to commercialize new products.

a) Other witnesses today, and many existing Federal programs, focus on expanding the Federal role in commercialization and providing financial assistance. How would you suggest --specifically -- that the Federal government meet these objectives by supporting utility efforts?

Answer: In addition to the Federal role of information, research, and standards cited in my testimony, there are several ways in which the federal government can work together with utilities to speed commercialization of energy efficient products. Federal facilities, which have a substantial potential for improving efficiency, could be valuable in demonstrating commercially viable, state-of-the-art technologies. In addition, federal purchasing power could play an important role in lowering the costs and speeding the widespread availability of advanced technologies for refrigeration, lighting, and other uses. PG&E would support the various proposals for encouraging the GSA to highlight purchases of high-efficiency products through approved federal product lists.

The federal government also could help support various utility programs that encourage the purchase of advanced technologies. For example, PG&E is working with a group of utilities to promote the early production and sale of highly efficient refrigerators--those that exceed even the 1993 standards by 25 percent or more. The effect of these efforts on the marketplace will be enhanced if several utilities participate and if federal purchasing power could be added. A federal role would be useful in coordinating these efforts.

b) Are there existing or proposed Federal programs to which you believe the Federal government is ill-suited?

Answer: Generally, PG&E does not have a quarrel with the appropriateness of current federal activities. There are several ways in which federal programs could be coordinated better with parallel private sector work. For example, a great deal of potentially useful technology is developed at federal laboratories but not effectively demonstrated or transferred to the private sector for production and marketing.

2a) Section 216 of the National Energy Conservation Policy Act currently prohibits utilities from the supply or installation of conservation measures for its residential customers. Is PG&E one of the utilities "grandfathered" out of this prohibition?

Answer: No.

b) Do you believe that this prohibition hinders utility conservation efforts, and should the Committee consider recommending its repeal?

Answer: In certain circumstance, the prohibition may hinder utility conservation efforts and its repeal may be appropriate. PG&E would not oppose repeal, but the company does not consider it necessary. PG&E uses contractors for the installation of utility conservation devices and has no plans to supply or install any of these measures, itself. The use of outside contractors has not hindered the company's utility conservation efforts. However, PG&E's circumstances may be different from other utilities in that the company has a long history of energy conservation and has developed a stable, experienced independent contracting force.

3) You state that most renewable technologies are 20 percent more expensive on a life cycle basis than similar fossil sources. Does that figure include the cost of fossil fuel extraction and environmental externalities? How would these factors be likely to change the cost ratio between renewables and conventional fossil fuels?

Answer: First, let me explain the 20 percent cost differential. This is a general figure that applies to "new" renewable technologies like wind, solar, geothermal and biomass. Well developed renewable technologies, such as hydro, are not included in that figure. In addition, since these technologies' economics are very natural resource dependent, the cost differential is location sensitive. For example, the same photovoltaic cell produces about twice the energy in California than it would in a state, such as Maine, because of the latter states' more northerly climate. In addition, California experiences its peak energy demands during summer afternoons--just when the sun is hottest and the maximum energy is available from solar technologies. Other areas experience load curves (winter peaking, etc.) less favorable to some of these technologies. The 20 percent figure is for good resource areas in California and other similar Southwest states. And, lastly, the figure varies by technology. For example, wind generation is very close to being fully cost competitive today while photovoltaics, except in limited special applications, have a cost differential considerably larger than 20 percent. The 20 percent is a composite figure across the various technologies.

Now, let me answer your specific question. The 20 percent cost difference for renewables is based on all life-cycle costs which an electric utility would actually incur, including capital, land, fuel (fuel prices include extraction costs), and any required pollution control devices. The 20 percent difference does not include any residual environmental externalities. For example, the social costs or benefits of residual air pollution, water pollution, and greenhouse gas emissions are not included.

Including environmental externalities in cost comparisons would reduce the 20 percent cost difference. However, there is substantial uncertainty regarding the magnitude of this reduction because it is hard to determine dollar values for environmental externalities. States that have tried do so have come up with widely divergent results. For example, New York has determined a "social cost" of $1/ton of carbon dioxide emissions, compared to $22/ton in Massachusetts. Social costs adopted by different jurisdictions for SOx, NOx, and particulate emissions span a similarly broad range. The low-end of the range has little impact on the 20 percent cost difference, whereas the high-end of the range for air emission values entirely eliminates the cost difference between renewables in good solar and wind areas as found in California and conventional fossil plants.

Faced with today's uncertainty in evaluating residual emissions, PG&E has proposed to the California Public Utilities Commission a temporary alternative to quantifying the environmental cost of fossil fuel. Specifically, we propose to hold auctions for new supply-side resources where up to 50 percent of the new resource needed would come from renewables if their costs are less than 20 percent higher than the cost of the lowest winning fossil bid. We feel paying such a premium on behalf of our resource acquisitions is justified by the environmental benefit and by creating a "market pull" for renewables which will help bring their costs down further.

4) Could you comment on "spot-pricing" or the practice of charging time of day rates for electricity usage. Is this one of PG&E's demand-side management techniques and if not what are the barriers to adoption?

Answer: PG&E has had a substantial and innovative program of time-of-use rates for many years. And these programs are attractive and acceptable to a great number of our customers, particularly the larger ones.

Historically, time-of-use rates have been carefully analyzed for their effects on customer demand. These effects have been incorporated into PG&E's load forecasts for electricity planning. Expanded use of TOU rates is not currently part of PG&E's demand-side management planning. The plans to achieve 2500 megawatts of new demand-side management by the year 2000 does not include any credit for TOU rate programs.

5) You state in your testimony that Federal and state governments have enormous capabilities for information development and transfer. What can you tell Mr. Watson here that would help improve your company's access to info and technology?

Answer: The federal government can play a significant role in information development and transfer. An excellent example is well-designed product lables to give consumers credible information on which to base rational, life-cycle purchase decisions about energy equipment. With respect to access to information, the company has observed that some federal program managers and staff have too little interaction with their private sector counterparts. PG&E suggests that there be more collaboration and joint ventures with relevant federal agencies so that each may become familiar with their respective constraints and issues of the energy market. Examples include joint research on technologies, joint conferences on specific topics, and cooperative funding of projects. DOE's involvement in joint ventures will enable it to provide more comprehensive technical transfer information to other utilities and manufacturers.

QUESTIONS FOR GREG RUEGER (Wirth)

1. Mr. Rueger, thank you for your excellent testimony. On page 4 of your written testimony, you mentioned that the retail availability of many energy efficient technologies is poor. As one who looked for compact fluorescent for six months, I understand what you are saying. Now those products are in hardware stores and manufacturers are hard-pressed to keep pace with demand. Do you have any recommendations for the Committee about how to remedy this problem? Can the Department of Energy do more in this area in terms of providing information or a hotline for consumers? And wouldn't it make sense for the General Services Administration to make that information available to federal energy managers in the listing of the federal product schedule?

Answer: The introduction of new products is a slow process in any market, particularly where the alternative product is already well-supplied and considered essential. Customers are reluctant to try new variations on currently effective technologies, often because the initial price is greater than the alternative. Examples are energy efficient lighting and refrigerators. Conversely, the risk for manufacturer development and production is high in certain consumer product sectors. One approach tried in California was to set appliance and building efficiency standards, which in turn accelerated the production of new energy efficient products. And, as mentioned before, the federal government can require well-designed product labels which will give customers credible information to base rational, life-cycle purchase decisions about energy equipment. Federal purchases also make attractive markets and should be encouraged.

The General Services Administration can be helpful and the DOE may be able to provide a forum for utility and other interested parties to coordinate methods of promoting rapid penetration of new products with manufacturers and retailers. The GSA could pull together lists of where to find particular energy efficiency products at a regional and national level and make them available.

2. Mr. Rueger, you mention in your testimony your support for renewable energy development. Looking 10 years into the future, from a utility perspective, what is the most promising renewable energy technology under development?

Answer: From a utility perspective, there are many promising renewable technologies. The most economic "new" (excluding hydro) renewable technology for California and many regions of the United States in the 1990s is the wind turbine. The key reason for the attractive economics is the vast improvement in the technology since the 1980s. Third and fourth generation machines, such as that now being developed by PG&E and U.S. Windpower, should be available in the mid-1990s. Wind farms using these technologies in good wind areas are expected to produce power at costs fully competitive to new fossil plants. However, wind generation is limited in its total energy potential. In northern and central California we have good wind sites for about 4,000 MW of added wind generation.

The solar technologies, photovoltaics and solar thermal, have great promise because they represent such an abundant potential for development, more than enough energy, to satisfy all of California's electrical needs, if storage technologies were also available. Another important benefit of these technologies is that energy produced is at our peak load hours in the summer when it is needed most in California. With continued support, several solar thermal technologies may reach cost-competitiveness with fossil fuel options by the year 2000. For central station power, photovoltaics will require considerable development well past 2000 before it is fully competitive. However, there are small but significant utility applications for photovoltaics that will be competitive in 10 years. Photovoltaics will most likely be deployed in "distributed" applications where the technologies' modularity will be exploited and the cost savings associated with avoided transmission and distribution power lines will make this an economic option.

New geothermal appears to be marginally economic today. Geothermal economics are highly sensitive to the characteristics of the geothermal reservoir. Dry steam reservoirs, such as those at the Geysers Area in California, have been very economic resources for PG&E. However, most new geothermal reservoirs do not provide such high quality steam. Some new "hot water" (as opposed to steam) geothermal plants in Southern California appear economic to develop. Once the best geothermal sites are developed, further improvements in the technology will be required to keep this option viable for expanded use.

Biomass technologies can be economic today if the biomass project receives "tipping" fees to take the waste (that is used for fuel). The economics of biomass projects tend to be very site specific because of the sensitivity of economics to these tipping fees.

3. On page 5 of your testimony you mentioned the financial barriers to energy efficiency investments. If public service commissions were sending the right signals to utilities, (as has been the case in California) do you believe this will continue to hinder efficiency programs? In other words, if regulatory reforms are undertaken to make demand-side investments as profitable as supply-side investments, couldn't we expect utilities to play a powerful role in financing efficiency investments?

Answer: Unequivocally yes! State regulatory bodies play a vital role in removing disincentives to reducing sales through conservation and equalizing supply- and demand-side investments from a shareholders' perspective. In 45 of the 50 states, current regulations work against the utility seeking conservation as in its best interest. Encouraging the removal of this barrier is the single most important action you can take. If regulatory reforms are undertaken to make demand-side programs as profitable as the supply-side, utilities will seriously invest in energy efficiencies whenever these efficiencies can be gained at less customer cost than supply addition alternatives.

Questions
Senator Malcolm Wallop (R-WY)
Energy Efficiency and Renewable Energy
provisions of S. 341, the Energy Security Act of 1991
February 26, 1991

PANEL II
General questions

1. a. Would you agree that regulatory interventions into the marketplace can impose unforeseen costs by reducing the flexibility of our economy and in the long-term reducing our options?

   b. Therefore, is it not essential that government initiatives rely on free-market, economic incentives and be based on rigorous cost-benefit analyses?

2. a. Would you agree that in order to be effective in promoting the most efficient use of energy, policy initiatives must rely on market forces?

   b. Would you agree that this is particularly true if integrated resources planning is to be effective in promoting energy efficiency and renewable energy technologies?

Answer: PG&E believes that where possible, the competitive market should be left unimpeded to achieve efficiencies in electric markets. Unfortunately, many legal and regulatory barriers exist today which impair effective market transactions and require government remedy. On the demand-side, current regulations in many states which financially hurt utilities when they promote customer efficiencies are an example of current market interventions that must be removed. On the supply-side, the federal government can best promote competition in markets by taking steps to increase the number of participants in electric generation markets, allowing greater pricing flexibility for electric transmission service and supporting incentive structures to eliminate some of the transactions costs and impediments now in effect. Most of these steps can be effected by careful revisions to the Public Utility Holding Company Act of 1935 and by encouragement of the FERC to promote efficient pricing of transmission service. However, the federal government must resist the temptation to "micro-manage" the energy market. Legislative restrictions, imposed to accomplish a given goal, while well-intended, can have the unintended result of reducing the flexibility and competitiveness of the utility industry.

Furthermore, market forces work only where markets operate efficiently. This is clearly not the situation in many areas of energy efficiency and renewable commercialization efforts. The key market barriers were discussed extensively in my testimony, and include, but are not limited to (i) the lack of customer information and knowledge; (ii) the lack of trained technicians; (iii) the separation of buyer from user; and (iv) regulatory disincentives to utilities. Like the legal or regulatory barriers mentioned above, the marketplace cannot be expected to operate efficiently until these barriers have been addressed by government action.

Building questions for all witnesses

3. This bill contains several provisions relating to energy efficiency guidelines for both new and existing housing. While I have no objection to the development of voluntary guidelines in this area, I am very concerned about the direction that the Administration and the Congress seems to be taking towards making these guidelines mandatory.

   a. Last year's Cranston/Gonzales Affordable Housing Act required the development of energy efficiency standards for new construction in order to be eligible for FHA mortgages. In your view, are such conditions necessary or desirable?

   b. What effect will this requirement have on the private mortgage market?

   c. What effect will the approach have on the building industry?

   Answer: The market barriers to efficiency are particularly strong with respect to the construction of new residential and commercial buildings. Home energy rating systems, once developed and tested, will help provide the information buyers will need to select and finance efficient homes. But many states, including California, have decided that minimum standards are the most cost-effective way to ensure that the most inefficient building practices are eliminated. Utility efficiency programs in new construction play a mutually supportive role with state procedures for setting standards.

   Minimum efficiency standards for FHA-financed homes have been in effect since the 1970s. The Cranston/Gonzales Act may enhance these standards, but the effects on the housing finance market will depend on how stringent they become. For example, if these standards are set below the levels already required in California, the impact will be nil.

Questions for Alliance to Save Energy

4. Reportedly the Alliance to Save Energy has concluded that S. 341 would reduce energy use in the year 2000 by only 0.3 percent. What is the basis for this conclusion? What modeling did the Alliance perform?

   Answer: No comment.

5. a. With respect to energy efficiency rating for existing housing, has DOE or any other federal agency proposed that a federally-insured mortgage be conditioned on the receipt of a minimum rating for the property to be mortgaged?

b. If such a condition were imposed, what alternative would be available to the seller of a home that did not meet the minimum rating requirement?

c. What effect would imposition of this kind of condition have on the resale housing market?

Answer: PG&E is involved in the California Home Energy Rating System, a non-profit, public and private sector organization which is developing a voluntary home energy rating system for use in this state. Once a rating system is developed, the company will be working with lenders to find ways to use the system to increase the availability of financing for more efficient homes. The rating systems may be able to play a significant role in improving the efficiency of new and existing housing. However, it is premature to require a single national rating system to be used before the diverse, voluntary efforts currently underway in many states have a chance to affect the market.

6. The Congress has enacted numerous environmental policies to deal with the potentially adverse impacts of our industrialized economy such as the impacts of energy production, transportation, and utilization.

a. Would you agree that existing national environmental requirements already have substantially internalized these potential environmental costs?

Answer: Existing federal and state regulations have substantially internalized many environmental externalities associated with new industrial facilities and, to a lesser extent, new vehicles. These regulations require emission control devices; however, they do not internalize residual values for emissions which are not controlled. For example, costs that may be associated with the risk of global climate change through emissions of carbon dioxide are not internalized. In many cases, the environmental externalities associated with existing facilities and vehicles are not substantially internalized. One noteworthy exception is the regulation under the recent federal Clean Air Act revisions of sulfur oxide emissions from new and existing power plants.

b. Would you agree that for so-called "least-cost" energy planning to be effective such analyses need to consider both the national security costs and benefits as well as any environmental costs and benefits?

Answer: Yes. Ideally, all costs and benefits should be considered, both short-term and long-term. However, overly broad consideration of externalities can lead to paralysis of decision-making. Some exercise of judgement is needed to consider only those externalities that our decisions can measurably affect.

c. **What are the current limitations regarding methodologies for performing "least-cost" energy planning?**

Answer: Current methodologies are adequate for use now, although further refinement is desirable. One barrier to "least-cost" planning is that evaluations of supply (generation) and demand (conservation) side resources are not well integrated. In California, the utilities are working with regulators and other parties to improve the analytical tools used to simultaneously evaluate supply and demand resources. A second barrier is that it is difficult to determine the social cost or value of externalities. Today, many of those values are politically rather than scientifically derived. If inaccurate or incomplete values for externalities are used in least-cost planning, bad investment decisions will result. Finally, least-cost planning must be used by all competitors in the electricity industry. If only regulated investor-owned utilities internalize externalities and as a result add generation with higher dollar cost, utility customers will be encouraged to seek service by federal power marketing agencies and municipal utilities or self-generators that do not apply the same value to externalities.

7. **American industry is encountering increasingly tough international competition. Our trade deficit is partially explained by new foreign competition. But the challenge is whether we can be more effective in delivering American developed energy technologies to the marketplace as a source for new businesses and jobs.**

a. **Would you agree that the advancement of new energy supplies and technologies must serve as a critical component in the growth of the United States economy.**

Answer: The country's energy sector is a huge market and its efficiency and cost of operation are major factors in the international competitiveness of other sectors of the economy, e.g., manufacturing and service. Clearly, the US economy can not thrive unless it has cost competitive energy resources. One way to advance new energy supplies is increased investment in research and development and especially commercialization and demonstration. Currently, public and private investment in energy R&D is approximately one-half of one percent of utility revenues, whereas comparable R&D investments in Japan are at least two percent of utility revenues--meanwhile, per capita energy consumption in Japan is about half of what it is in the US.

b. **Would you also agree that the commercialization of new energy technologies can serve to reduce our energy related trade balance?**

Answer: Yes, and we especially support increased commercialization of new energy efficiency and renewable technologies.

8. **Would you agree that there is a need to streamline or remove certain regulatory procedural barriers that unreasonably constrain the deployment of new, advanced renewable and energy efficiency technologies.**

   Answer: Yes, regulatory procedural barriers do exist which constrain the deployment of new, advanced renewable and energy efficiency technologies. For example, in many states there is a long-standing regulatory bias toward supply investments. Not only are most utilities rewarded solely for their investments in production and delivery facilities, but ratemaking generally makes utilities averse to customer efficiency improvements because reduced consumption actually lowers revenues and profits. Finally, for full deployment of energy efficiency technologies, utility recovery for past plant investments must be decoupled from sales. Utilities will not vigorously pursue programs that harm their shareholders.

   Least-cost energy planning

   Section 3101 of S. 341, as does the Administration's National Energy Strategy, fosters State public utility consideration of least-cost energy planning which is defined to mean "any standard, regulation, practice or policy by which a State regulatory authority considers, or requires a State regulated electric utility to consider or implement, a plan for action (including the construction of or purchase of electric energy from new generation facilities and investment in or expenditures for conservation, energy efficiency resources, other demand-side management measures) to be taken by a State regulated electric utility for purposes of providing adequate and reliable service to its electric customers with the incurrence of lowest costs by such utility and its customers."

9. **How does "least-cost" planning differ from "life-cycle" costing of energy alternatives?**

   Answer: The term "life-cycle" costing refers to an engineering economics technique of evaluating the costs and benefits of resources on a comparable basis. In electricity planning, supply-side (generation) resources have been traditionally evaluated using life-cycle costing. Demand-side resources (conservation programs) have generally been compared with each other using life-cycle costing. However, supply and demand resources are not generally compared directly with each other. Least-cost planning refers to an integrated life-cycle comparison of supply and demand resources. In addition, least-cost planning often broadens the evaluation to include environmental and other externalities (cost is broadened to be "social," not direct dollar costs).

10. **Least-cost planning requires that assumptions be made regarding interest rates, the life of a proposed facility, fuel prices, maintenance costs and so on.**

    a. **It would appear that such calculations would favor technologies with low capital costs (such as gas-fired) over longer-lived capital intensive facilities (such as coal and nuclear facilities).**

Answer: Done properly, least-cost planning does not unfairly favor particular technologies. However, low capital cost technologies (such as gas-fired) have tax advantages compared to capital-intensive technologies (as discussed in my written testimony on renewables). In addition, capital-intensive facilities in the electric industry are inherently riskier investments than are low capital cost facilities.

b. **It would appear that least-cost planning would provide an economic premium to demand reduction and energy conservation measures, and perhaps off-system power purchases, rather than the construction of new baseload power plants. Would you comment?**

Answer: Proper least-cost planning does not "provide an economic premium"--it merely reflects the reality that in very many cases it is cheaper to buy surplus power from neighbors or to save energy rather than to build new power plants. The "premium" would only come in if the externality of the environment is included in the definition of cost. In this case, energy conservation would be given a boost over options that produced air emissions or other environmental impacts. Off-system power purchases would receive a premium only if the resources used to produce that power were "cleaner" or a utility only valued environmental impact to its own area and not that of its neighbors.

11. a. **There are those who advocate that "least cost" planning should include so-called "environmental externalities" whatever that concept includes. If I am not mistaken, "least-cost" planning already includes the costs of environmental controls. Would you agree?**

Answer: Both traditional planning and "least-cost" planning include the costs of environmental controls. However, these controls generally reduce, but do not eliminate, environmental impacts. For example, new coal-fired power plants that have all required controls would still emit some sulfur oxides. These emissions are "environmental externalities," which some parties believe should be quantified in comparing new coal-fired power plants to other energy resources. The primary objection to including environmental externalities in least-cost planning is that societal values are so difficult to quantify.

b. **To the extent that any "least-cost" planning includes externalities, should it not also include national security costs, such as those associated with maintaining a military presence in the Middle-East? What other externalities should be considered?**

Answer: Ideally, all externalities should be considered. However, overly broad consideration of externalities can lead to paralysis of decision-making. Some exercise of judgement is needed to consider only those externalities that our decisions can measurably affect. The externalities PG&E has studied, but not used directly yet in planning decisions include environment and fuel supply security (diversity of fuel sources).

Additional questions
For Scott Sklar - Solar Energy Industries Assoc.

Renewable Energy Joint Ventures

1. Your statement indicates your support for expansion of the renewable energy joint venture program as provided in S.341. In your view, what types of projects would be likely to compete for the joint ventures in each of these areas?

2. You mention in your statement that an additional joint ventures should be included for solar thermal. Isn't this a project already funded by DOE? What additional benefits would be obtained by including this project as a joint venture?

Initiatives to Encourage Renewable Energy Development

1. You mention in your statement that additional annual expenditures of $500 million over the next 9 years for solar and renewables would increase the market share from 9 percent to nearly 20 percent of total U.S. energy consumption. That is a significant increase in spending over the FY-92 request of $166 million.

Please explain where this $500 million would be spent. How much would be spent on R&D activities?

How would a more modest annual increase in spending -- such as $200 million -- affect the market share for solar and renewables?

2. What other initiatives should be considered by the Congress to encourage commercialization of renewable energy technologies?

Technology Transfer

You say in your statement that new techniques are necessary to get technology development out of the laboratory and into the marketplace. You mention a figure of $20 million necessary to institute new innovations in tech transfer.

1. What innovations? What additional action is required? Is legislation necessary to accomplish this?

2. Should the laboratories be doing more in applied research?

You also mentioned in your testimony that the joint ventures must be oriented to be a little more useful to industry. Please explain what you meant by this. Is legislation necessary to accomplish this?

Questions
Senator Malcolm Wallop (R-WY)
Energy Efficiency and Renewable Energy
provisions of S. 341, the Energy Security Act of 1991
February 26, 1991

PANEL II

General questions

1. a. Would you agree that regulatory interventions into the marketplace can impose unforeseen costs by reducing the flexibility of our economy and in the long-term reducing our options?

   b. Therefore, is it not essential that government initiatives rely on free-market, economic incentives and be based on rigorous cost-benefit analyses?

2. a. Would you agree that in order to be effective in promoting the most efficient use of energy, policy initiatives must rely on market forces?

   b. Would you agree that this is particularly true if integrated resources planning is to be effective in promoting energy efficiency and renewable energy technologies?

Building questions for all witnesses

3. This bill contains several provisions relating to energy efficiency guidelines for both new and existing housing. While I have no objection to the development of voluntary guidelines in this area, I am very concerned about the direction that the Administration and the Congress seems to be taking toward making these guidelines mandatory.

   a. Last year's Cranston/Gonzales Affordable Housing Act required the development of energy efficiency standards for new construction in order to be eligible for FHA mortgages. In your view, are such conditions necessary or desirable?

   b. What effect will this requirement have on the private mortgage market?

   c. What effect will the approach have on the building industry?

SEIA

SOLAR ENERGY INDUSTRIES ASSOCIATION Suite 805 777 North Capitol Street, N.E. Washington, D.C. 20002-4226 (202) 408-0660
Fax: (202) 408-8536

March 19, 1991

1991 MAR 21 PM 9 38

ENERGY AND NATURAL RESOURCES
RECEIVED
MAR 2[illegible] 1991
WASHINGTON, D.C.

The Honorable J. Bennett Johnston
Chairman
Senate Energy & Natural
Resources Committee
U.S. Senate
Washington, D.C. 20510

Dear Senator Johnston::

In response to your letter of February 27th requesting answers to additional questions, I have attempted to respond briefly to each.

Renewable Energy Joint Ventures

1. Joint ventures are cost-shared projects used either to validate nearly commercial technologies or buy-down the risk of more mature technologies that just haven't achieved enough market penetration to access conventional financing.

2. S.341 does not have a solar thermal joint venture, and the technology is no less or more mature than the other technologies that have one. DOE's only joint venture is for solar detoxification. The solar thermal industry particularly wants joint ventures to validate dish/engine and central receiver technology options which are nearing commercialization.

Initiatives to Encourage Renewable Energy Development

1. An increase to $500 million would still be half of the funding renewables received in FY'81 yet it would be less than waht the United States is spending for nuclear fission and fusion R&D and will provide far more than these technologies will over the next decade. A $200 million renewable energy budget would basically be a maintainance budget which could not achieve the 20 percent goal. I have attached the alternative energy budget which establishes the directions and initiatives for funding.

2. Other initiatives should include an expanded technology transfer program to pull innovations more quickly from the federal laboratories, market incentives to extend the existing solar & geothermal 10 -percent business energy tax credits through 1996, a 2.5 cent per kwh production tax credit for all renewables, guidance by FERC to state regulatory commissions to consider externalities such as fuel diversity in the rate base, requirement for the federal power marketing administrations to utilize renewables, mandates for federal procurement officials to purchase solar and renewables under certain lifecycle cost conditions, and development of a capitol pool or long term financing programs to lengthen the amorization of renewable energy demand and supply side applications so that the monthly financing charges are less than monthly fuel costs.

Technology Transfer

1. Legislation is urgently needed to direct the national laboratories to develop more effective outreach programs to industry. The industry has tried for the last five years to get specialized programs, timely updates and special R&D seminars for industry on technical advances, but to no avail. The legislation would create the atmosphere to get these programs finally started.

2. Laboratories must be more active in applied research. Relevancy is essential, particularly for such a young industry which is composed primarily of small businesses. Joint venture programs must be industry-driven and must be cost-shared by the industry or by the endusers. Joint venture legislation is mandatory to get the development chain started in an effective way.

General Questions

1a. Regulations do not necessarily impose unseen costs and frankly in an industrialized economy are necessaru to insure health, safety, and long term issues that are not accounted for in a free market.

1b. The free market incentives are the best way to accelerate energy which usually involves tax and lending incentives.

Page three

2a. Market forces are essential, but frankly, relying totally on market forces would increase U.S. energy imports which increases our trade deficit, and places alternative energy on hold until market shortages occur. These shortages will ultimately raise prices which would then open the door to solar and renewables. Any country that would wait until high energy prices caused by shortages and supply interruptions, is insuring a future of increased debt, energy insecurity, and forfeiture of our leadership in alternative energy which will cause the United States to be a net importer of renewable energy technologies just at the time we would really need them. None of our international competitors hold the pure free market view, and it is this purest vision of the free market which puts the United States at a tactical disadvantage in the world markets. So I do not agree with the premise of the question because it is not practical in the real world of the energy marketplace.

2b. I have not seen it proven what integrated resource planning can or cannot accomplish. I do not believe IRP has been demonstrated long or conclusively enough to draw any conclusions at this time.
Building Questions for All Witnesses

3a. While I am not familiar with energy efficiency standards under the Affordable Housing Act, a certain level of energy efficiency requirements are necessary for two reasons. First, it will insure that housing is more affordable since its sustaining costs for energy will be lower. Second, it will prepare the U.S. industry for the onslaught from abroad of competing housing technologies.

3b. The private mortgage market welcomes these innovations openly because it makes their financing more affordable since unexpected costs such as increasing energy prices will lessen the chance for loan defaults.

3c. Initially, any new requirement may produce problems, but it is essential for the building industry to insure its long term dominance. And even if it is painful, it would be far better than relinquishing our markets to overseas imports of manufactured housing.

I appreciate the opportunity to answer these questions and I would be happy to provide additional information at any time.

Sincerely,

Scott Sklar
Executive Director

Responses From Dick Watson, NARUC

RESPONSES TO THE QUESTIONS FROM CHAIRMAN JOHNSTON

Question #1: Section 3201 requires State regulators to consider making energy conservation as profitable to utilities as investments in generating facilities. This may be the single most powerful element in this bill. However, as you point out, NARUC opposes any legislation that would interfere in the authority of State regulators. What options are available to Congress to encourage State regulators to follow this policy -- other than just requiring that they "consider" them? Are financial incentives and disincentives appropriate?

Response: By allowing State commissions to consider rather than to require them to adopt least cost planning regulation, Section 3201 recognizes the leadership role that States have played and continue to play in encouraging utilities to pursue energy conservation programs. Congress recognized this leadership role in constructing the language that is found in the Public Utility Regulatory Policies Act (PURPA), which Section 3201 would amend. Making this ratemaking standard non-binding on State commissions is clearly consistent with the intent of Congress in enacting PURPA. This flexibility will allow State commissions to develop least cost planning programs that take into account the unique generation and demand-side management resources that are available in a given utility's service territory.

Beyond Sections 3201 and 3202 of Title III, the NARUC believes there are ample incentives to encourage utilities to use energy conservation measures. The passage of the Clean Air Act Amendments of 1990 and the increased emphasis on meeting electric demand growth through non-polluting sources are two major factors that will undoubtedly make energy conservation a more attractive option for electric utilities. Moreover, several States have adopted competitive bidding procedures that allow demand-side programs to compete with new generation sources in meeting a utility's future load growth projections.

As Commissioner Williams testified, his State of New York has adopted financial incentives to encourage utilities to undertake energy conservation programs. Such incentives adopted by State commissions are entirely appropriate as indicated in the **Resolution in Support of Incentives for Electric Utility Least-Cost Planning**, which was attached to our prepared testimony (Attachment #1). However, this resolution does not endorse financial incentives to utilities that would be provided through Federal legislation.

On the customer side of the meter, the NARUC strongly supports legislation that would remove the taxability of rebates provided to utility customers who purchase energy efficient appliances or measures. Enactment of this legislation would go a long way toward promoting energy conservation at the customer level, which should be the primary target of energy conservation incentives.

2

Question #2: On page 2, you say that this bill lacks "measures that would produce real savings." However, you then go on to stress that Section 3201 must not interfere in State authority, that Section 3202 [3002] regarding home energy ratings must be voluntary, and you oppose Title XV regarding PUHCA. Where would you suggest the bill be strengthened to increase energy conservation savings?

Response: The NARUC has supported minimum energy efficiency standards for products, as indicated in the attached **Resolution on Appliances**. This resolution called on Congress to enact National appliance standards that were more stringent than State standards. The NARUC endorsed this limited form of Federal pre-emption on the grounds that this would be the most cost-effective way of achieving energy savings that would benefit all utility customers who are often the purchasers of major appliances. We believe that the same can be accomplished under Title III and those sections pertaining to commercial products.

We would also note that there are fundamental differences in setting standards for commercial products and in setting ratemaking standards for utility energy conservation programs. Energy conservation programs in the context of utility least cost planning must be evaluated along side a number of other factors, such as those enumerated in Section 3201 (b) of Title III. Considering this and the fact that a number of States have attempted to quantify environmental externalities as part of their least cost regulations, it can easily be seen that standards for making products more energy efficient are fundamentally different than standards to make utility demand side management programs more profitable.

The NARUC also believes that home energy efficiency ratings are different from energy efficiency standards set for commercial products, and that S. 341 should recognize this difference. Home energy ratings should be developed by the Energy Department in the manner prescribed in the legislation but they should be adopted on a voluntary basis by State and local governments taking into account the specific geographic, economic and social conditions that exist in different parts of the country. To our reading, the current draft of Section 3002 does not afford this degree of flexibility and should be made more flexible by making it clear that the procedures developed by DOE may be adopted by State governments.

Finally, Title XV of S. 341 is inconsistent with Title III's promotion of least cost utility planning in that it would permit wholesale power transactions to take place outside the scope of a State commission's authority, removing the right of the State to judge adequately the prudency of these purchases. Clarification that State commissions do have the authority to disallow the costs associated with a wholesale power purchase that does not meet the requirements of a State-approved utility least cost plan would greatly enhance the ability of States to encourage utility investments in energy conservation programs. To keep the status quo would have the effect of undermining existing State least cost planning regulations and frustrate their adoption by other States.

Question #3: What initiatives has NARUC undertaken to encourage energy efficiency at the State level?

Response: The NARUC has accomplished a number of activities in promoting the development and implementation of energy efficiency programs both in the electric and gas utility sectors. Many of these activities are described in the grant proposal submitted to the Oak Ridge National Laboratory for a Integrated Resource Planning Project. A copy of this proposal is attached.

In addition, the NARUC has testified in support of appropriations for DOE Integrated Resource Planning program that provides technical assistance and valuable knowledge and research on the state of IRP. In recognition that the Department's National Energy Strategy has placed heavy emphasis on IRP, the NARUC has testified that funding for this program should be increased to $10 million, which is $5 million more than the Administration's FY 1992 budget request. A copy of this testimony is attached.

We would add that any attempt to increase funds for DOE's IRP program should be seen as a separate issue from the authorization of funds for grants to assist State commissions in pursuing least cost planning regulation. Moreover, the NARUC's endorsement of this grant program in no way diminishes its support for funding the other, equally valuable State and Local Assistance Programs that assist State and local agencies in carrying out their energy conservation missions.

Question #4: Do you anticipate widespread adoption of the residential ratings program under a voluntary program as described in your statement?

Response: Adoption of home energy rating systems has already taken place in several States, as we have indicated in previous testimony submitted to this Committee's Subcommittee on Energy Regulation and Conservation concerning S. 1355, "The Residential Energy Efficiency Ratings Act." A copy of this testimony is attached. Although it is risky to predict the future, legislation that requires the Secretary of Energy to put in place general guidelines for developing energy efficient rating systems may be just the catalyst that is needed for other States to begin adopting their own residential energy rating systems. The key is to allow States and other local government agencies to experiment with different types of energy rating systems and to make adjustments to these over time.

Question #5: Why are the utilities disinterested or skeptical as you say about the faster deployment of renewable energy technologies?

Response: The utilities may see few benefits from investing in renewable technologies. While utilities will earn a return on renewable technology investments as they do on other capital investments, renewable technologies may not have established a reputation among utility system planners as reliable resource options that compete economically with "familiar" non-renewable supply-side resource options. While supply-side renewable resource options do not face the kind of disincentives which DSM revenue losses generate, utility planners may fear adverse public/regulatory responses to investments in renewable resource technologies which they may think involve higher than average investment and maintenance costs and lower than average reliability. Until this uncertainty is reduced and renewable resources have a proven track record, they will be less acceptable to utilities.

It is worth pointing out that in Maine utilities have been making investments in renewable resource wood fueled generating plants.

Generally, one can expect that investment in renewable resources will increase as the costs and the perceived cost risk decrease.

RESPONSES TO THE QUESTIONS FROM SENATOR WALLOP

Question #1: Do you support comprehensive legislation such as S. 341 that contains both energy production and energy efficiency initiatives?

Response: As indicated in our prepared testimony, the NARUC supports legislation that takes a balanced approach to energy supply and energy conservation initiatives. In assessing the approach that is taken in S. 341, the NARUC concluded that provisions pertaining to energy conservation and renewable energy should be strengthened. We have suggested ways of accomplishing this both in our prepared statement and in the preceding answers to Chairman Johnston's questions.

Question #2: a. Would you agree that regulatory interventions into the marketplace can impose unforseen costs by reducing the flexibility of our economy and in the long-term reducing our options?

b. Therefore, it is not essential that government initiatives rely on free-market, economic incentives and be based on rigorous cost-benefit analyses?

Response: Although it is true that the price of natural gas during the 1970s and for much of the 1980s was artificially distorted by pricing schemes imposed by Congress and Federal regulation, it is also true that there are considerable "unforseen costs" in nearly all energy commodities that are not imposed by "regulatory intervention." For instance, American consumers do not see all the costs associated with the imported oil, much of which comes from the Persian Gulf. In addition, the environmental costs associated with the burning of oil and other fossil fuels are also not completely accounted for in their price to end users. Therefore, some argue that relying on the market to set the price of these fuels distorts the energy choices that both utilities and consumers have to make. These distortions must somehow be accounted for by government policymakers, if the goal of a National Energy Strategy is to allow all energy resources to compete fairly.

Question #3: a. Would you agree that in order to be effective in promoting the most efficient use of energy, policy initiatives must rely on market forces?

b. Would you agree that this is particularly true if integrated resources planning is to be effective in promoting energy efficiency and renewable energy technologies?

Response: As noted above, there are inherent problems in relying solely on market forces in crafting a National energy policy. In the context of energy efficiency, policy initiatives must recognize that there are significant market barriers to the development and use of energy efficiency technologies and products. One of the barriers often cited is market penetration. Promoting acceptance of products that reduce energy consumption but have a large upfront cost and long payback period is a role that the NARUC believes can be fulfilled to some extent by governmental action such as removing the taxability of rebates to utility customers who have purchased energy efficient appliances or measures.

In the case of renewable technologies, the NARUC has identified a number of areas that need to be addressed by State commissions and Federal policymakers to untap the potential of renewable energy sources. A recent report, prepared by the NARUC Committee on Energy Conservation and approved by the NARUC Executive Committee for publication, identifies these areas and offers some suggestions for increasing the use of renewable energy technologies. A copy of this is enclosed.

Question #4: How does "least cost" planning differ from "life-cycle" costing of energy alternatives?

Response: Life-cycle cost of an energy alternative is an approach considering the benefits and costs of an investment option. It is distinguished from a benefit cost analysis approach which may examine only the time it takes to recover in benefits the costs of an investment (i.e., simple pay-back analysis) or which may consider the benefits and costs of a resource option over a period of time which differs from the expected life of a resource option (e.g., calculating benefits and costs over a 10 year period when the investment may be expected to have a useful life of 15 or 20 years).

Least cost planning describes a planning approach which seeks a planning strategy that offers a least cost path to meeting future energy needs. Typically, least cost planning methods incorporate life-cycle costing analysis of a broad range of supply and demand side resource options. The life-cycle costing analysis done for least-cost planning will take into consideration the difficult to quantify benefits and costs (e.g., environmental externalities) not commonly associated with financial life-cycle cost analysis.

Question #5: NARUC has adopted a resolution urging its member Commissions to take appropriate actions to "ensure that the successful implementation of a utility's least-cost plan is its most profitable plan."

a. What criteria would be used to make that determination?

Response: The NARUC resolution suggests that each State regulatory commission would examine how utility actions to achieve a least cost plan objective will affect the utility's profits. This typically requires the PUC to initiate a public proceeding or a staff study to assess how the established rate regulation practices of the PUC affect utilities' profits. The NARUC resolution aims initially at examining how rate regulation practices affect utility profits when a utility undertakes a large investment in demand-side management resources. In most States, the revenue losses from utility conservation programs reduce profits significantly (i.e., on a kWh basis the reduction in profits is significant compared to the resource costs and benefits of the kWh savings). The affect of investments in renewable supply-side resources on profits has not been examined as thoroughly yet, though an effective least cost planning program should do so.

b. Least cost planning requires that assumptions be made regarding interest rates, the life of proposed facility, fuel prices, maintenance costs and so on.

Response: This observation is accurate. In the case of these considerations, the requirements of least cost planning do not differ from present utility planning practices which often do not compare all resource options in a balanced way.

c. It would appear that such calculations would favor technologies with low capital costs (such as gas-fired turbines) over longer-lived capital intensive facilities (such as coal and nuclear facilities). Would you comment?

Response: We would respectfully disagree with this observation. Utility planning has developed methods for comparing fairly the benefits and costs of different resource options (e.g., levelized cost analysis). These methods are used routinely by utility planners. Least cost utility planning uses these same practices. The whole point of such analysis is to make sure that different resource options with varying capital and operating cost profiles are compared in a balanced way. It is important to remember that least-cost planning does not aim to identify the arithmetic least cost option. Typically, least cost planning aims to address a multitude of competing objectives which require that the lowest cost option not always be selected. A good example is the likely desire to diversify fuel dependency which will result in investments in types of capacity, all of which may not be the lowest cost option.

d. It would appear that least-cost planning would provide an economic premium to demand reduction and energy conservation measures, and perhaps off-system power purchases, rather than construction of new base-load power?

Response: We again respectfully disagree with this observation. The ultimate objective of least-cost planning is to make decisions on a "least-cost" basis, offering no premium for one option over another. Many States which have adopted least-cost planning practices, however, have implemented incentive and cost recovery practices that may have the effect you describe. The purpose of these "economic premiums" is to accelerate change, and put demand-side options on an equal footing with other options.

Some State commissions, the New York Public Service Commission among them, have offered economic premiums to attract utility interest and to motivate the utility resource commitments needed to move to a balanced evaluation. The New York PSC, for example, has indicated that such economic premiums are not permanent. The commission has indicated that the greatest premiums are offered to the utilities that promise the greatest change in the least time. The long term goal of the State's least cost planning efforts remain the creation of balanced incentives which will lead New York's utilities to achieve the least-cost plans.

6. a. There are those who advocate that "least cost" planning should include so-called "environmental externalities," what ever that concept includes. If I am not mistaken, "least cost" planning already includes the costs of environmental controls. Would you agree?

Response: Yes, but even after complying with environmental standards there remain residual environmental effects that vary widely from one resource option to another (e.g., a complying coal plant has very different environmental impacts than a complying gas plant or DSM investment).

Common utility planning practice includes the cost of environmental controls but not the environmental costs which are uncontrolled. Typically utilities have considered the cost of constructing and operating the electric system. These are the out-of-pocket costs a utility incurs to reduce the environmental impact of its facilities and operations, i.e., the internalized cost of environmental protection or perhaps "environmental externalities." Environmental externalities adjustments account for the environmental impacts that are not controlled; that is, those not internalized by the utility but instead paid for or shifted to society. The recent efforts to account for "environmental externalities" aim to correct for this deficiency in utility cost accounting when making planning decisions with long term consequences.

b. To the extent that many "least cost" planning includes externalities, should it not also include National security costs, such as those associated with maintaining a military presence in the Middle East? What other externalities should be considered?

Response: Including National security costs, such as those associated with maintaining a military presence in the Middle East, as an externality assessment is appropriate. Individual States face a difficult problem of deciding how to account for their out-of-State impacts. In New York, for example, the environmental externality analysis considers global warming but gives it a relatively small weight compared to other local environmental factors because the Commission believes this is an issue that must be addressed on a National scale at least. The New York PSC Orders make clear that the Commission will consider raising this number when other governmental units begin to take similar actions. For an individual State to account fully for such National or global externalities, when other States do not, puts the State at an economic disadvantage in competing with States that choose to ignore such externalities.

Other externalities often mentioned are:

-- health and environmental costs of fuel extraction, processing, transportation and storage; and

-- balance of payments effects, as well as National security effects, of using imported fuels.

The
ALLIANCE
To Save Energy

1725 K Street, N.W.
Suite 914
Washington, D.C. 20006-1401
202/857-0666
Fax: 202/331-9588

Board of Directors

Chairman
Senator Timothy E. Wirth

Co-chairman
Senator James M. Jeffords

Founding Chairman
Charles H. Percy

Past Chairmen
Senator John Heinz
Daniel J. Evans

Treasurer
Thomas P. Dickerson
General Partner
Tullis-Dickerson & Co., Inc.

* * *

William A. Nitze
President

James L. Wolf
Executive Director

* * *

Norman R. Augustine
Chairman and CEO
Martin Marietta Corporation

Joseph A. Califano, Jr.
Managing Partner
Dewey, Ballantine, Bushby, Palmer and Wood

Edward J. Carlough
General President
Sheet Metal Workers' International Association

John W. Ellis
Chairman and CEO
Puget Sound Power & Light Company

Robert K. Gray
Chairman and CEO
Hill and Knowlton Public Affairs Worldwide

Thomas R. Kuhn
President
Edison Electric Institute

George H. Lawrence
President
American Gas Association

Mildred B. McCauley
Member Board of Directors
American Association of Retired Persons

Richard L. McGraw
Vice President of Corporate Affairs
COMSAT Corporation

David O. Maxwell
Chairman and CEO
Fannie Mae

Frank H. Pearl
Chairman
Rappahannock Investment Company

Russell W. Peterson
President Emeritus
National Audubon Society

W. T. Stephens
Chairman and CEO
Manville Corporation

Robert B. Stobaugh
Charles Edward Wilson Professor of Business Administration
Harvard Business School

W. Roger Strelow
Vice President
Bechtel Environmental, Inc.

Stephen Wiel
Commissioner, State of Nevada
Public Service Commission

Responses of James L. Wolf
Executive Director
Alliance To Save Energy
to
Committee Questions

QUESTIONS FOR JIM WOLF

1) I'd like to compliment you on a comprehensive and specific statement. Obviously a problem that the Committee faces is establishing priorities in focusing its efforts. Which policies do you think offer the greatest likelihood of enactment and the greatest potential for savings?

2) At several points in your statement you focus on increasing commercialization of new products through demonstration projects, tech transfer, and joint ventures. On page 7 you say that DOE should have a new program to "emphasize working with marketing executives -- not researchers".

Could you be more specific about how DOE could work with corporations to promote the commercialization of their products.

3) Although I understand that some States have attempted to qualify environmental externalities, I am not sure how this is done. Please explain how these environmental costs are calculated.

4) Please explain how fuel use clauses restrict incentives for utilities to install efficiency.

5) Regarding incentive bonuses for facility managers as advocated in your testimony, why not just make it mandatory among all the Federal buildings so that the money for incentives could go for real improvements?

6) Why mandate the use of fuel cells for Federal buildings unless the resource is shown to be the most cost-effective one?

7) You suggest in your testimony that the PURPA ratemaking standard under section 3201 of my bill be modified to provide that:

> "the net income of the electric utility after implementation of cost-effective conservation measures is at least as high as such net income would have been if the energy conservation measures had not been implemented."

You further indicate that this language would require a utility to be compensated for lost sales attributable to its conservation program, but would not necessarily require it to be compensated for reduction in net income that results from foregone capital investment in generation.

Perhaps I'm confused, but I don't follow your reasoning. It seems to me that net income is measured as an absolute dollar amount and that your suggested language would mandate compensation attributable to foregone capital investment. Would you please elaborate on your statement?

Questions
Senator Malcolm Wallop (R-WY)
Energy Efficiency and Renewable Energy
provisions of S. 341, the Energy Security Act of 1991
February 26, 1991

PANEL II

General questions

1. a. Would you agree that regulatory interventions into the marketplace can impose unforeseen costs by reducing the flexibility of our economy and in the long-term reducing our options?

   b. Therefore, is it not essential that government initiatives rely on free-market, economic incentives and be based on rigorous cost-benefit analyses?

2. a. Would you agree that in order to be effective in promoting the most efficient use of energy, policy initiatives must rely on market forces?

   b. Would you agree that this is particularly true if integrated resources planning is to be effective in promoting energy efficiency and renewable energy technologies?

Building questions for all witnesses

3. This bill contains several provisions relating to energy efficiency guidelines for both new and existing housing. While I have no objection to the development of voluntary guidelines in this area, I am very concerned about the direction that the Administration and the Congress seems to be taking toward making these guidelines mandatory.

   a. Last year's Cranston/Gonzales Affordable Housing Act required the development of energy efficiency standards for new construction in order to be eligible for FHA mortgages. In your view, are such conditions necessary or desirable?

   b. What effect will this requirement have on the private mortgage market?

   c. What effect will the approach have on the building industry?

Question for Alliance to Save Energy

4. Reportedly the Alliance to Save Energy has concluded that S. 341 would reduce energy use in the year 2000 by only 0.3 percent. What is the basis for this conclusion? What modeling did the Alliance perform?

5. a. With respect to energy efficiency ratings for existing housing, has DOE or any other federal agency proposed that a federally-insured mortgage be conditioned on the receipt of a minimum rating for the property to be mortgaged?

   b. If such a condition were imposed, what alternatives would be available to the seller of a home that did not meet the minimum rating requirement?

   c. What effect would imposition of this kind of condition have on the resale housing market?

6. The Congress has enacted numerous environmental policies to deal with the potentially adverse impacts of our industrialized economy such as the impacts of energy production, transportation and utilization.

   a. Would you agree that existing national environmental requirements already have substantially internalized these potential environmental costs?

   b. Would your agree that for so-called "least cost" energy planning to be effective such analyses need to consider both the national security costs and benefits as well as any environmental costs and benefits?

   c. What are the current limitations regarding methodologies for performing "least-cost" energy planning?

7. American industry is encountering increasingly tough international competition. Our trade deficit is partially explained by new foreign competition. But the challenge is whether we can be more effective in delivering American developed energy technologies to the marketplace as a source for new businesses and jobs.

    a. Would you agree that the advancement of new energy supplies and technologies must serve as a critical component in the growth of the United States economy?

    b. Would you also agree that the commercialization of new energy technologies can serve to reduce our energy related trade balance?

8. Would you agree that there is a need to streamline or remove certain regulatory procedural barriers that unreasonably constrain the deployment of new, advanced renewable and energy efficiency technologies?

Least-cost energy planning

Section 3101 of S. 341, as does the Administration's National Energy Strategy, fosters State public utility consideration of least cost energy planning which is defined to mean "any standard, regulation, practice or policy by which a State regulatory authority considers, or requires a State regulated electric utility to consider or implement, a plan for action (including the construction of or purchase of electric energy from new generation facilities and investment in or expenditures for conservation, energy efficiency resources, or other demand-side management measures) to be taken by a State regulated electric utility for purposes of providing adequate and reliable service to its electric customers with the incurrence of lowest costs by such utility and its customers."

9. How does "least cost" planning differ from "life-cycle" costing of energy alternatives?

10. Least cost planning requires that assumptions be made regarding interest rates, the life of a proposed facility, fuel prices, maintenance costs and so on.

    a. It would appear that such calculations would favor technologies with low capital costs (such as gas-fired turbines) over longer-lived capital intensive facilities (such as coal and nuclear facilities). Would you comment?

    b. It would appear that least-cost planning would provide an economic premium to demand reduction and energy conservation measures, and perhaps off-system power purchases, rather than the construction of new base-load power plants. Would you comment?

11. a. There are those who advocate that "least cost" planning should include so-called "environmental externalities", what ever that concept includes. If I am not mistaken, "least cost" planning already include the costs of environmental controls. Would you agree?

    b. To the extent that any "least cost" planning includes externalities, should it not also include national security costs, such as those associated with maintaining a military presence in the Middle-east? What other externalities should be considered?

Responses of James L. Wolf
Executive Director
Alliance To Save Energy
to
Committee Questions

Question 1.

The policies to promote the greatest energy savings are clearly in the transportation sector, and a strong CAFE provision, coupled with other incentives to promote efficiency, would have the greatest impact.

Within Titles III and IV, the greatest opportunity lies in setting standards for efficiency for lighting, motors, distribution transformers, and small package HVAC equipment. The second largest opportunity is to encourage states to conduct least-cost planning coupled with reforming regulations to make the least-cost plan the most profitable; qualifying conservation as part of PURPA in those states that choose not to make these changes to allow conservation to fairly compete with new supply resources would be a very effective tool to promote the acquisition of efficiency.

Finally, the Federal Power Marketing Administrations and the Tennessee Valley Authority should be required to acquire cost-effective conservation resources in the region they serve, and only sell power to those utilities who do the same.

Question 2.

The traditional focus of DOE's work has been with the researchers in corporations. I recommend that DOE convene task forces of the marketing executives of these corporations to identify specific assistance the government could provide. It could include, for example, technical assistance to potential users of products to assist them evaluate its benefits, or other assistance to encourage utilization of conservation technologies.

The EPA is conducting a successful program of this type in its green lights program to encourage corporations to re-lamp with efficient lighting. Their assistance includes seminars for users explaining the benefits of efficient lighting; product testing; awards; and other programs.

Question 3.

Different states are using different approaches to quantify environmental externalities. New York and Massachusetts are two of the states in the forefront. The process typically includes adding a quantifiable external cost value in the weighing of different resources in the least-cost planning procedures for new resource selection.

In New York, for example, different values are assigned for air pollution (including NOx; SO_2; CO_2; and others); water pollution; and land pollution effects (which include noise, visual impact and other factors). All resources, including traditional supply side-resources, renewables, as well as efficiency use the same scoring criteria. The total amount of the impacts are then totaled for each resource. Receiving the worst score on all the relevant factors would raise the resource cost by about 1.4 cents/kwh. I have attached an article which describes the New York approach in more detail.

Question 4.

Fuel use clauses may inhibit the incentive to invest in improvements in supply-side efficiency if the additional cost of all fuel is passed on to the consumers without taking into account any variance in the total amount used. If the cost can be simply passed on, there may be a reduced incentive to minimize the total cost of this input as prices rise.

Question 5.

Providing incentives is key to achieving better Federal energy management. Mandating that people upgrade facilities, without providing incentives for outstanding performance, will likely yield only poor and at best, minimal compliance. The proposed incentive program is low-cost (about one tenth percent of the amount needed to make improvements), however it will pay for itself many times over by creating a legion of motivated energy managers throughout Federal facilities who are aggressively pursuing efficiency projects. This approach is extensively used in the private sector to encourage outstanding performance; almost 40 percent of energy managers average more than $10,000 a year in bonuses.

Question 6.

I do not recommend mandating the use of fuel cells in all federal facilities. I do recommend fuel cells as a potential candidate for a demonstration technology, in conjunction with the demonstration of other promising new technologies. After a few demonstrations, we will have better information to identify which technologies are truly the most cost-effective.

Question 7.

The issue you raise is a complex one and has been extensively discussed at an advisory committee to the EPA concerning drafting the new clean air act amendment regulations. Whether a utility should be compensated for the income not realized from a foregone capital investment is an issue on which the advisory committee did not reach consensus. The language I suggested concerning "net income" is the precise language of the clean air act which requires states to do regulatory reform to be eligible for the special 300,000 ton allowance for conservation and renewable resources.

The advisory committee recommended that the regulations be such that this language would be interpreted as meaning the utility would be required to be compensated for lost sales revenue due to conservation, but not for the income on foregone supply side investments. The latter would be left to state discretion. The meaning of the phrase "net income" was extensively discussed. It was agreed that this could include such factors as risk adjusted, as well as earnings per share.

I believe the important principle to establish is that at a minimum, the utility should be compensated for lost sales revenue, and that states should have the flexibility to compensate the utility additionally if it is considered appropriate to truly 'level the playing field". Accordingly, if the current language on "profitable" is maintained, I believe that the right criteria would be that the investments in demand-side resources are "at least as profitable" as supply side resources. This would give states the desired flexibility.

Questions from Senator Wallop:

Question 1. (a and b)

Regulations can impose unforeseen costs on the economy, but they also have the potential to address market failures, be "market enhancing", and reduce costs. For example, cost-effective conservation cannot fairly compete because of the way current utility regulation and ratemaking rewards supply-side investments. Changing regulations so that all resources fairly compete, and their full costs -- including environmental and other externalities -- are accounted for, promotes more economic efficiency and reduces the costs of providing energy services. Rigorous cost-benefit analysis, uniformly applied to supply and demand-side resources, can be very beneficial in this analytical process.

Question 2. (a and b)

Policy initiatives can be an important supplement to market forces, particularly when there are demonstrable market failures. Electricity pricing, for example, is typically at average cost and not marginal cost. Traditional ratemaking discourages utilities from pursuing cost-effective conservation. The environmental cost of utilizing fuel is often not included in the cost of the fuel. Failure to recognize these market limitations would lead to a very sub-optimal allocation of resources if we were to rely solely on the market.

The challenge is to design policies that can make maximum use of market forces to accomplish our objectives (like the allowance trading provisions of the clean air act).

Question 3.

a. The Cranston-Gonzales National Affordable Housing Act requires HUD to update energy standards for housing assisted by HUD, including new homes financed through the FHA program. The new standards must be at least as stringent as the Model Energy Code of the Council of American Building Officials.

This requirement is both necessary and desirable. The federal government should not finance energy-inefficient homes that cost more in total terms (mortgage payment plus energy bills) than homes built to modern, cost-effective standards. Building codes prevailing in many parts of the country are lax, permitting homes to be built and financed through FHA that cost much more to operate than necessary. These high energy bills make these homes less affordable, and exacerbate FHA's serious delinquency and default problems.

Studies by the Alliance and Pacific Northwest Laboratory show that the efficiency levels in the Model Energy Code are very cost-effective. Not only do the modest added costs of the higher standards quickly pay for themselves in energy savings, homeowners actually pay less each month in mortgage payments plus energy bills than they would for homes built to lesser standards.

b. The effect on private mortgage markets will be minimal. Our study shows that the MEC will add about $1,400 to the cost of the average home, contributing about $12 to the mortgage payment at today's rates. This would increase the mortgage payment by only about one percent. This amount is small enough that it will not change normal underwriting practices. Moreover, energy bill savings more than offset the tiny increase in mortgage payments, so the homeowner is immediately better off in a Model Energy Code home.

c. Adopting the Model Energy Code for FHA housing will have a minimal impact on the building industry. In fact the National Association of Home Builders now supports the Model Energy Code, as witnessed by its favorable comments on the recent HUD rulemaking adopting the Model Energy Code. About one-third of the states, including Wyoming, already have energy codes at least as stringent as the Model Energy Codes. The effect of the higher FHA standard will be to motivate other states to follow this example. It will alert builders, code officials, and others in the housing industry to the need for more energy-efficient construction.

Question 4.

The Alliance and the American Council for an Energy Efficient Economy performed a series of analyses to estimate the likely impacts of the bill on national energy use. The attached document summarizes this analysis. To illustrate the kind of analysis used to create these estimates, we describe below the way we estimated the impact of the home energy ratings provision and the lamp and luminary labelling section.

The home energy ratings provision in section 3002 calls for DOE to establish guidelines for home energy rating systems, and to offer technical assistance to states. However, because there were no requirements that would necessarily increase the number of energy ratings conducted annually, and because there was neither a performance target nor a funding authorization for the technical assistance effort, we were constrained to project only modest increases in energy ratings and resulting energy savings. Here are the steps in our analysis:

1. Based on our knowledge of market activity, we estimated that currently about 40,000 ratings are conducted each year.
2. We projected that the bill would cause a 10 percent annual increase in the number of ratings through 2000.
3. Based on experience in current field programs, we estimated that 25 percent of the ratings would result in either more efficient new construction or retrofits to older homes. Our field tests and other operating programs indicate that 25 percent energy savings are achievable in either case.
4. Using DOE's Residential Energy Consumption survey to project baseline energy use, we projected the energy savings that would accrue from this level of market penetration. Savings were expressed in annual savings for 2000 and cumulative savings through 2000.

The analysis for lamp and equipment labelling in section 3008 is found on the attached spreadsheet in the row entitled "luminaire labelling."

Question 5.

a. HUD has long required that new homes built under its auspices meet minimum energy standards. Neither HUD, DOE, nor any other agency has proposed that a federally-insured mortgage for an *existing home* be made contingent on a specific energy efficiency rating. However, DOE is proposing in its National Energy Strategy that energy ratings become mandatory on all homes prior to sale. Also, the Farmers Home Administration, recognizing energy costs as a major factor in the affordability of housing, frequently makes energy improvements in homes financed in its program to bring them up to minimum standards.

b. If a home were found to be deficient in energy features prior to being financed via an FHA mortgage, the seller would have several options. First, the seller could make the necessary improvements directly prior to sale, as sellers frequently must do to meet other FHA building standards. The other principal option would be to encourage the buyer to use the energy efficient mortgage option available in the FHA program. This option allows the buyer to add up to $3,500 of energy improvements to the mortgage.

c. Imposing this kind of condition would have little effect on resale markets. The FHA program already imposes various standards on the existing housing stock; these already can cost sellers money prior to sale. Energy standards have the unique added value of benefitting the buyer and society through reduced energy use and reduced pollution. And because the energy efficient mortgage option provides an additional way to pay for energy improvements, they are less of a barrier to resales than other building defects.

Question 6.

a. Existing environmental requirements may have internalized some of the environmental costs associated with energy production and use, but not all of them. Some pollutants, such as carbon dioxide, are not controlled. Others, such as visual, noise, or other aspects may not be the subject of national legislation or otherwise internalized costs. Finally, local conditions may cause local officials to establish higher premiums for environmental protection than set at the national level. The procedures that New York State has adopted, for example, are a model that allows the flexibility to address local conditions or other assessments of environmental damage.

b. When considering externalities in the context of least-cost planning, it is certainly appropriate to consider the national security costs and benefits of different options along with environmental benefits. We should choose the least-cost option among all that satisfy our need for energy services.

c. Least-cost planning is an evolving art and science. Issues concerning future price estimates, participation rates in demand-side programs, and others illustrate the type of analysis that need refinement. A successful least-cost plan employs sensitivity analysis to evaluate the particular assumptions which may make the result change. It is important to seek a solution that is considered "robust" for the varying sensitivities.

Question 7. (a and b)

The advancement of new energy supply technologies may have an important role in the growth of the economy, but a better way to phrase the issue is that we must advance the development of new energy service technologies. This would include supply and demand-side technologies.

It is important to recall that the economy grew by 40 percent from 1973-1986 with no growth in total energy use. A whole host of new technologies did appear on the market -- ranging from light bulbs that are 75 percent more efficient than traditional bulbs to new furnaces and motors.

As the globalization of markets continues, energy efficient products -- those that use energy most efficiently or conserve energy -- will be at a premium. World-wide energy prices are typically much higher outside the United States, and therefore efficiency "sells" even more there than in the U.S. because of the quicker paybacks. Our manufacturers will have to manufacture these products or American consumers will be purchasing foreign made products of typically greater efficiency.

Question 8.

It may be appropriate to streamline some regulatory or procedural barriers to bring new technologies to the market faster. It is important, however, that the process ensure that environmental, safety, and other requirements are adequately addressed.

Question 9.

Least-cost planning can utilize "life-cycle" costing of energy alternatives. The least-cost planning process, however, ensures that all the resources are compared using similar assumptions, such as discount rates, energy price forecasts, and similar information. The planning process seeks to evaluate all resources on a consistent basis. The planning process is also an integrated, dynamic approach, so the interactions among a mix of various resources to meet future energy needs is fully understood.

Question 10. (a and b)

The least-cost planning process compares all resources on an equal and consistent basis. The goal is to provide for the needed energy services at the lowest total cost, typically on a present value basis. Since the time horizon is included in the analysis, longer lived capital investments are not necessarily disadvantaged. The value of them is discounted, as all resources are, at the appropriate discount rate. The resources being selected may often be efficiency resources because those are the cheapest available. This assessment includes a consideration of critical factors such as reliability, dispensability, diversity, risk, and other important attributes of the electrical system.

It would be incorrect to state that the process puts a premium on the acquisition of efficiency resources. It would be correct to state that the result of a fair treatment of all resources on a consistent basis results in efficiency often - but by no means always - being the selected resource to meet future energy needs.

Question 11. (a and b)

As detailed in the response to question 6, least-cost planning would include the costs of environmental controls required for particular pollutants to the extent that the cost of the resource includes these controls in its assessment. However, several issues remain. First, the costs of controls may not be an assessment of the true damage done by the pollutant. Second, all pollutants and resulting damage are not controlled. Finally, local conditions may warrant an assessment of a larger premium for environmental damage. National security considerations are an appropriate externality to include in a least-cost assessment.

Appendix II—Additional Material Submitted for the Record

LBL-28407
UC-400

Energy Technology for Developing Countries: Issues for the U.S. National Energy Strategy

December, 1989

Prepared by Staff From:

Lawrence Berkeley Laboratory
Team Leader
Argonne National Laboratory
Oak Ridge National Laboratory
Sandia National Laboratory
Solar Energy Research Institute
Los Alamos National Laboratory
Pacific Northwest Laboratory

Applied Science Division
Lawrence Berkeley Laboratory
1 Cyclotron Road
Berkeley, CA 94720

Prepared for the U.S. Department of Energy under Contract DE-AC03-76SF00098

Table of Contents

1. Executive Summary 1
  1.1 Introduction 1
  1.2 Developing Countries and a U.S. National Energy Strategy 1
  1.3 Energy and Developing Countries 1
  1.4 Energy Assistance and Cooperation Programs 2
  1.5 Technology Transfer and the Need for Energy Technology RD&D 3
  1.6 A Possible DOE Role 4
  1.7 Conclusions 4
2. Developing Countries and a U.S. National Energy Strategy 6
3. The Energy Situation in Developing Countries 8
  3.1 Overview 8
    3.1.1 The increasing importance of the developing countries to the world energy picture 8
    3.1.2 Differences in energy consumption among the developing countries 8
    3.1.3 Energy production in developing countries 9
    3.1.4 Future energy consumption in developing countries 9
    3.1.5 Lack of capital for the energy sector of developing countries 10
    3.1.6 Inefficiency in energy supply and end-use in developing countries 10
  3.2 Developing Country Problems and Perspectives 13
    3.2.1 Oil Exporters with Large Reserves Per Capita 13
    3.2.2 Oil Exporters with Small Reserves Per Capita 13
    3.2.3 Large Developing Countries with Energy Resources 13
    3.2.4 Low-income Nations with Slow Development 14
    3.2.5 Rapidly Developing Countries 14
    3.2.6 Eastern Europe 14
  3.3 Summary 15
4. Current Energy Assistance and Cooperation Programs with Developing Countries 16
  4.1 What is being done and by whom? 16
    4.1.1 International institutions 16
    4.1.2 Bilateral assistance 19
    4.1.3 Other assistance 19
    4.1.4 Energy research relevant to developing countries 19

4.1.5 U.S. assistance 19
4.2 How well is it working? 21
4.3 Conclusions 22
5. Technology Transfer and the Need for Energy Technology RD&D 24
5.1 Overview 24
5.2 Approaches to Technology Transfer 24
5.3 The Need for Energy Technology RD&D 26
5.4 Examples of the potential role of energy RD&D 27
5.4.1 Example: Compact Fluorescent Lamps in India 27
5.4.2 Example: Integrated Biomass and Gas Turbine Facility 28
5.5 Partial list of needed energy technologies and capabilities 28
6. A Possible DOE Role 30
6.1 Country-Specific Emphasis 30
6.2 Technology-Specific Efforts 30
6.3 A Comprehensive Information Dissemination System 30
6.4 The Next Steps 31
Appendix A A-1
Appendix B B-1
Appendix C C-1
Appendix D D-1

Preface

On June 28 and 29, 1989, the U.S. Department of Energy (DOE) organized a meeting with representatives of the national laboratories to discuss laboratory input into a DOE exercise to develop a National Energy Strategy. One of the results of this meeting was a request that a group of laboratories join together to produce this report, dealing with energy technologies for developing countries. This report constitutes one of the national laboratory inputs into the National Energy Strategy.

Participants from seven national laboratories met together on several occasions and have contributed to this report. The laboratories and the team members who have participated in preparing this report are:

Lawrence Berkeley Laboratory[*]
Don Grether
Mark Levine
Steve Meyers
Jayant Sathaye

Argonne National Laboratory
Bill Buehring
Dick Cirillo
Carole Szpunar

Battelle-Pacific Northwest Laboratory
Duane Deonigi

Los Alamos National Laboratory
Wayne Hardie

Oak Ridge National Laboratory
Bill Fulkerson
Tom Wilbanks

Sandia National Laboratories
Gary Jones

Solar Energy Research Institute
Bob Noun

---

[*] LBL was the team leader for this effort. Mark D. Levine was overall editor.

Energy Technology for Developing Countries:

Issues for the U.S. National Energy Strategy

1. Executive Summary

1.1 Introduction

Energy is a critical input to the economic system of all nations. Issues involving energy are of particular importance to developing nations. Efficient energy production, use, and allocation can contribute to economic development in significant ways. Inefficient energy systems can be a drain on capital and can retard sustainable development.

This study explores the role of energy among developing countries to better understand how these energy issues impact the United States. We conclude that the energy choices made by developing countries already have major impacts on the United States. These impacts will grow in the coming decades. We also note that present efforts to provide energy assistance to developing countries are very limited, compared with the magnitude of the problems being faced. We are convinced that improved energy technologies, as well as training in their use, are and effective mechanisms of technology transfer, are an important ingredient in solving the problems.

1.2 Developing Countries and a U.S. National Energy Strategy

Developing nations have become a major participant in the world energy economy. As a result, the energy choices made by these nations will be increasingly important in determining the future stresses on the international oil market and the global climate. Developing countries also comprise rapidly growing potential markets for U.S. technologies. Their economic and political stability is important to U.S. security. Energy decisions play a particularly important role in overall well-being and development of low income nations as energy is a major input to industrial activities and rural development, and requires a major commitment of capital in the economy. Finally, the U.S. has traditionally sought to improve the living conditions of those in less fortunate nations; energy assistance is a key component of such humanitarian support.

The U.S. National Energy Strategy should therefore be concerned with the relationship of critical energy choices made by developing nations to U.S. objectives. Better technologies for providing energy services and for converting and using energy more efficiently, cleanly, and economically are powerful tools for achieving both U.S. and developing nation objectives. Every nation is unique in its conditions for making energy choices, and technologies developed for U.S. markets may not meet the needs in many developing nations, at least not without significant modifications.

1.3 Energy and Developing Countries

In 1970 the developing countries of the world consumed about 16 percent of the world's commercial sources of energy; currently they consume about 25 percent. Most analyses of future energy demand in the developing world show continued rapid growth, both in absolute terms and relative to the industrialized world.

This energy growth has not been without substantial problems. There are continuing shortages of energy for productive uses in many parts of the developing world. Energy is used very inefficiently in all sectors. Power losses are typically high, power generation is often inefficient, industrial activities often use outmoded technologies or are poorly maintained, buildings and appliances use considerably more energy than necessary, and transport needs are growing rapidly but not efficiently. Rural energy needs are often inadequately met, and biomass is often used in ways and quantities that may not be sustainable. Access to efficient technologies for energy supply, conversion, and end-use is limited. Capital for the power sector, for exploration, and for investment in efficient end-use technologies is inadequate. A recent study by the U.S. Agency for International Development (AID) estimated a need for $125 billion per year for new generating capacity, but an availability of only $50 to $60 billion per year. This study noted that substantial efficiency gains could reduce the capital requirements considerably, but that capital would still remain insufficient to meet needs.

The mix of energy problems faced by developing nations varies considerably among different regions and countries. Nonetheless, because of its primary role in fueling economic development and providing for welfare of inhabitants, energy constitutes a central issue of sustainable economic development. Both energy, and especially energy services, are needed. Inefficient use of energy or application of outmoded technologies is injurious to development. Improved energy technologies, along with training in technical, economic, and policy aspects of energy, can make a significant difference.

1.4 Energy Assistance and Cooperation Programs

Numerous international and governmental agencies play a major role in providing loans and assistance to developing countries. The energy-related loans of the World Bank have grown to an annual level of $4 billion in recent years. Most of these loans are for power generation; there has been a growing emphasis on power sector loans for rehabilitation and improved transmissions and distribution. Loans from other international banks and from OECD nations, again primarily for power projects, total several billions of dollars annually. The United Nations and the Energy Sector Management Assistance Program (ESMAP) of the World Bank together provide less than $100 million per year for energy assistance in a variety of areas. The U.S. Agency for International Development provides somewhat more than $100 million per year for energy projects, training, small-scale demonstrations, and policy development. There is bilateral energy assistance from several other OECD nations.

The Department of Energy has been active in concluding international agreements for cooperative programs with a variety of countries concerning numerous energy technologies. These agreements permit joint undertakings, but little funding has been made available to carry them out. DOE has led an active multi-agency program, the Committee on Renewable Energy Commerce and Trade (CORECT), to promote technology transfer of renewable energy technologies. DOE has also initiated a program to spur the export of coal-based technology to developing countries. Each of these programs has annual funding somewhat greater than $1 million.

The DOE national laboratories have been active in a variety of programs to provide energy assistance to developing countries. More than $10 million annually are devoted to these efforts. Virtually all of the funding for these activities comes from outside DOE.

In spite of the variety of existing programs, most officials in developing countries concerned with energy matters argue that the overall level of energy assistance is inadequate. Many assistance agencies are reaching a similar view, especially given the recent concern about the relationship between energy decisions in developing countries and the global environment and the opportunities for energy technology exports from the developed countries.

It is useful to put the energy assistance to developing countries in perspective. We have identified annual loan activities, mostly for electric power, of about $6 billion per year. Including some bilateral and multilateral sources that we have not yet uncovered, the annual loan package may be on the order $10 billion. This is contrasted with an annual investment in the electricity system alone of $50 to $60 billion per year, and an estimated need for twice that amount for power. (This is not including investment requirements of other energy supply sectors or for end-use efficiency improvements.)

We have identified technical assistance for energy on the order of $200 to $300 million per year from the AID, the United Nations organizations, and ESMAP. If one includes assistance from other countries and the technical support often derived from portions of the loan funds, the total is perhaps $500 million per year. This may be contrasted to the annual commercial energy costs of about $450 billion per year for developing countries. Thus, the assistance is on the order of 0.1% of total energy expenditures. It is not surprising that assistance from others has thus far made only limited contributions to solving energy problems in developing countries, considering the disparity between the magnitude of the problems and that of the assistance provided.

Stepping aside from the question of the overall level of support, there is broad agreement that the current programs of assistance are deficient in at least four respects: (1) in many cases they are not improving the performance of energy institutions in developing countries; (2) they are not directing enough attention to the benefits of energy efficiency improvements; (3) they are not getting improved energy technologies into use to meet developing country needs; and (4) they are frequently working from an inadequate technology and knowledge base due to the lack of RD&D to adapt energy technologies to developing countries.

1.5 Technology Transfer and the Need for Energy Technology RD&D

There are significant barriers to the effective transfer of technology to developing countries. Many of these are of an institutional nature: the policy environment is poorly developed, energy prices are held artificially low, hard currency for the purchase of technology is not available, and institutions are not in place to permit effective implementation of technology. Because of these difficulties, it is important that the problem of technology transfer be addressed in the context of assistance to improve the performance of institutions in developing countries responsible for energy.

Nonetheless, there have been important cases of successful transfer of technologies and capabilities to developing countries. Many of these have been in the area of energy efficiency, where the economic benefits have been apparent. Renewable energy technologies, especially in remote areas, have seen successes. Opportunities for fossil energy technologies are widespread, although the technology transfer efforts in this area, as in others, have been limited.

There is a substantial need for energy technology research, development, and demonstration to provide an underpinning to the technology transfer process. The needs are in four related areas:

(1) Adapting available technologies

Many seemingly attractive technologies are already available, but are not being used because the technologies need to be adapted to developing country conditions. Typically, for example, equipment needs to be able to operate with minimal maintenance and to withstand fluctuating voltages in power grids.

(2) Developing new or improved technologies to fill gaps in the portfolio of options

Although the energy technology portfolio has been considerably enhanced by the energy R&D investments of the 1970s and 80s, there remain a number of gaps which limit the choices available to a developing country. In the case of electric power generation, as discussed above, there is a great need for alternatives to fossil-based power and more efficient fossil energy conversion.

(3) *Demonstrating innovative technologies*

Innovative technologies, whether adaptive or new, need to be demonstrated at a sufficient scale to establish operating parameters and costs so that the countries and lending institutions will consider the technologies to be commercially viable. Lending institutions tend to be conservative by nature and, in addition, do not fund the development and demonstration of innovative technologies.

(4) *Establishing and improving in-country energy R&D capabilities*

In-country energy R&D capabilities can help the country (1) evaluate and adapt imported technologies and (2) make effective use of other R&D being conducted in the country. There are often R&D projects that are best done using capabilities in developing countries. Finally, technology transfer and commercialization are often aided by the active involvement of in-country researchers.

A considerable number of useful RD&D activities along the lines indicated above could be developed and applied to the developing country context. As noted, such efforts need to be combined with active involvement in improving the energy institutions in developing countries. Participation of a variety of governmental agencies and of the private sector is needed to mount a successful program.

1.6 A Possible DOE Role

DOE has substantial qualifications to play an important role in providing energy assistance to developing nations. First and foremost, DOE is an energy technology agency. It has the expertise to mount a significant RD&D effort along the lines discussed above. DOE also has considerable expertise for training activities and other programs to improve energy decisionmaking in developing countries. Such efforts, if they are pursued, could best be done in concert with other U.S. agencies (especially AID, Commerce and State) and international bodies (the UN and the World Bank).

Considering the growing importance of developing nations to oil markets and the global environment, and as potential markets for U.S. technologies, the topic of energy technologies for developing countries is of growing importance. DOE has substantial capabilities to contribute to solutions of major global energy problems. It does not as yet have a clear mandate, mission, or sufficient programs to become a major player in working with developing countries.

In our judgment, the next step is for DOE, as part of its National Energy Strategy, to reassess its role in providing energy technology RD&D and technology transfer to developing countries. Additional efforts to develop more concrete plans will be necessary to establish major new programmatic activities related to energy technologies for developing countries, if the DOE is to play a significant role in this area.

1.7 Conclusions

We conclude that:

- a variety of enhanced energy technology R&D efforts is needed to adequately deal with a host of key developing country energy issues,
- creation of desirable energy choices and the adoption of improved energy technologies require broad and integrated programs, including substantial emphasis on technology transfer,

- opportunities exist for greater efforts to promote the use of technologies for more efficient end-use, non-fossil fuel supply, more energy-efficient and environmentally acceptable conversion of fossil fuel, and
- DOE has important capabilities to apply in concert with other public and private resources to meet these needs to encourage the adoption by developing nations of improved energy technologies.

2. Developing Countries and a U.S. National Energy Strategy

The emergence of the developing countries as a major and growing consumer of energy and energy services, both from indigenous and international sources, indicates that developing country energy issues should be considered in a reassessment of a U.S. national energy strategy. The key factors that influence a U.S. perspective on energy and developing countries are:

- *World energy availability and price, particularly for oil*

  Rising oil consumption by the developing countries will inevitably result in the world's oil demand more rapidly approaching its production capabilities, with normal market forces leading to higher prices sooner than otherwise. Periods of high oil demand have a higher potential of cartels (e.g., OPEC) again controlling the market and dramatically increasing prices. Also, rising domestic energy demand among developing country oil exporters may limit their export potential. Thus, U.S. prospects for importing oil at reasonably predictable prices are linked to the oil use of the developing world.

- *Global environmental concerns associated with increasing energy use*

  The growing use of fossil fuels by developing countries will increase the release of carbon dioxide (CO_2) and possibly other greenhouse gases (e.g., methane), with a corresponding increase in the potential for global climate change. Of particular concern in this regard are China's plans to massively increase its use of coal. In addition, there are concerns related to certain energy-using devices, chiefly domestic refrigerators and air conditioners, since essentially all those presently available use chlorofluorocarbons (CFCs). Many developing countries have experienced dramatic growth in the use of these products; others are likely to see growth in the future.

- *Potential markets for U.S. energy and energy technologies*

  Growth in energy demand and the services provided by energy provide opportunities for the U.S. to export raw materials, products, and technology. As discussed in later sections, the situation presents a substantial challenge since "off the shelf" products that are suitable for the U.S. (and other industrialized countries) are often not suitable for developing countries. On the other hand, in some cases the international market can support energy technologies that are not presently cost competitive in the U.S. Thus, the international market may provide support for a U.S. industry while it develops a product that is eventually cost-effective in the U.S. domestic market as well. For example, developing countries have many people and commercial activities far from the electrical grid and from fuel supplies; as a result, photovoltaic systems and other renewable energy technologies have seen considerable applications in developing countries.

It could well be in the U.S. interest to play a leadership role in helping the developing countries make critical energy decisions. Better technologies for providing energy sources and for converting and using energy more efficiently can be powerful tools for achieving both U.S. and developing nation objectives.

The issue of global warming is worthy of particular consideration. The development and export of cost-effective energy technologies that reduce growth or increase efficiency of the use of fossil fuels could mutually benefit the U.S. and developing nations. These objectives could be achieved through increasing efficiency of converting fossil fuel to electricity, increasing efficiency of end-use devices, reducing transmission, distribution, and transport losses, and developing non-fossil alternatives to fossil energy supply. New, active programs in these areas could contribute to a leadership role for the U.S. on global climate change issues. Many such programs might best be accomplished through cooperative multilateral efforts with other industrialized nations. At the same time, such programs might serve to reduce political tensions among developed and developing nations on global environmental concerns. Thus, by providing targeted energy technology assistance to developing nations, the U.S. and other industrialized nations could (1) achieve multiple domestic and international objectives, (2) demonstrate constructive actions to deal with potential global warming, and (3) increase cooperation among industrialized nations and reduce tensions between the developed and developing regions of the world.

3. The Energy Situation in Developing Countries

3.1 Overview

3.1.1 The increasing importance of the developing countries to the world energy picture

Over the past two decades, the share of world energy consumption accounted for by developing countries has increased. In 1970, the developing country share of world primary commercial energy consumption was 16%; by 1987, this share had grown to 25% (Figure 1).[1] This change resulted from the combination of fast growth in developing country energy consumption (5.2% per year between 1970 and 1987) and much slower growth in the OECD countries (1.0% per year). The developing country share of world oil consumption has grown in similar fashion: from 14% in 1970 to 24% in 1987.

The relatively rapid growth in commercial energy consumption in the developing countries has been the result of population growth, urbanization and the accompanying modernization of people's way of life (for example, greater ownership of automobiles and electric appliances), and growth in industrial production. In the oil-exporting developing countries, increases in oil revenues have played an important role in accelerating industrial and personal energy consumption.

3.1.2 Differences in energy consumption among the developing countries

Growth in energy demand has been much faster in some parts of the developing world than in others (Table 1). In the 1970s, increase in energy consumption was particularly rapid in South East Asia and China. Between 1979 and 1987, growth ranged from only 2.9% per year in Latin America to 6.5% in South Asia.

Table 1

Historic Growth in Primary Commercial Energy Consumption in the Developing Countries
(% per year)

	1969-79	1979-87
Latin America	5.8	2.9
South East Asia	9.0	4.9
South Asia	3.8	6.5
China	7.7	3.4
Middle East	6.3	5.4
Africa	5.8	3.7
Total	6.5	3.9

Sources: British Petroleum, 1988; Lawrence Berkeley Laboratory. The regional shares of total energy consumption in 1987 were: Latin America (21%), South East Asia (11%), South Asia (12%), China (37%), Middle East (9%), Africa (11%).

---

[1] Developing countries here include all countries in Africa, the Middle East, Asia (except Japan), and Latin America and the Caribbean. This definition includes the newly industrialized countries of Asia. The term *energy consumption* as used in this report refers to modern forms of energy; it does not include biomass fuels, for which consumption statistics are not well documented. For a report summarizing current knowledge of the use of biomass for energy, see "Biomass Fuels in the Developing Countries: An Overview," S. Meyers and G. Leach, LBL-27222, July 1989.

Growth in commercial energy consumption by the developing countries was slower in the 1980-1987 period (3.9% per year) than in the 1970s (6.5% per year). This was mostly due to economic stagnation in Latin America and Africa, and slower growth in China, which alone accounts for 37% of total commercial energy consumption by developing countries. The increase in 1987 (5.2%) was higher than the average for the 1980-1987 period, mostly due to faster growth in Asia.

3.1.3 Energy production in developing countries

In many developing countries, the increase in energy consumption has been supported by growth in domestic energy production. This growth has included oil, natural gas, hydroelectricity, and coal, with the importance of each of these varying according to the situation of individual countries. Exploitation of these resources was accelerated by the increase in oil prices in 1973-74 and 1979-80. In the case of oil, much of the increased production has been exported, but domestic consumption is claiming an ever greater share of production.

An important issue for a number of developing countries is development of natural gas resources. Economically-attractive resources exist in many countries, but they tend to be difficult to develop because the main market for the gas is local and foreign oil and gas companies are thus unable to recoup their investment through hard currency earnings. Assistance in development of gas resources and the infrastructure required for gas transport is beginning to receive more attention. Nonetheless, few developing countries have as yet indicated major plans to develop or use natural gas resources.

3.1.4 Future energy consumption in developing countries

The future rate of increase in energy consumption in the developing countries will depend on many factors, including the world economic situation, the price of oil, the outcome of debt negotiations, economic and trade policies, and availability of capital for the energy sector. Regional differences may become more marked: for example, growth in energy consumption seems certain to be faster in South and East Asia than in Latin America and Sub-Saharan Africa.

A recent end-use based scenario of world primary energy consumption by region show the share of total energy use in the developing countries (including China) growing from 23% in 1985 to 29% in the year 2000 and to 44% in 2025 (Table 2 and Figure 2).[2] Of course, the relative importance of the developing countries will depend both on their growth and the evolution of energy consumption in the OECD and in the USSR and Eastern Europe. But the high rate of population growth in developing countries and the nature of the development process, along with the structural change in the OECD toward less energy-intensive economic growth, ensure that the share of world energy consumption accounted for by developing countries will continue to increase in the coming decades.

---

[2] The scenario shown was adapted by Lawrence Berkeley Laboratory (LBL) from scenarios prepared by LBL and the World Resources Institute for the U.S. Environmental Protection Agency's Report to Congress on global climate change, *Policy Options for Stabilizing Global Climate*. The numbers shown in Table 2 are the midpoint between the low and high growth scenarios prepared for EPA. The assumed average annual gross domestic produce (GDP) growth rates for this "medium" scenario for 1985-2000 and 2000-2025 are as follows: U.S. (2.5%/2.0%), other OECD (2.7%/2.0%), USSR/E. Europe (3.6%/3.1%), China (4.5%/4.0%), other LDCs (3.9%/3.5%).

Table 2

Scenario of Future Primary Energy Consumption in the World
(Quads)

	1985	2000	2025
US	71	80	90
Western OECD	64	71	76
Eastern OECD	18	22	23
USSR & E. Europe	67	88	105
China	23	37	81
Middle East	6	9	21
Africa	7	12	28
Latin America	15	23	50
South & East Asia	14	24	52
World Total	285	366	526

Source: Lawrence Berkeley Laboratory, based on scenarios prepared by LBL and the World Resources Institute for the U.S. Environmental Protection Agency, Sept. 1989.

3.1.5 Lack of capital for the energy sector of developing countries

A shortage of capital for investment in the energy sector often constrains resource development, which in turn inhibits energy and economic growth in many countries. The problem is particularly acute in the power sector, where new energy facilities tend to be highly capital-intensive. Many developing countries already face power shortages that cause considerable loss of economic production and demand for electricity is growing rapidly in most of these countries. The U.S. Agency for International Development (AID) estimated in 1988 that if the performance of power systems in the developing world remains the same as today, and economic growth averages 4.5% per year, the developing nations as a group would require 1,500 GW of additional generating capacity between 1988 and 2008.[3] (Current total installed capacity in developing countries is about 500 GW.) This expansion would cost over $2,600 billion, or an average of over $125 billion per year. Currently, around $50-60 billion is being spent per year.

Many developing countries already invest a substantial portion (commonly between 20 and 40%) of public funds in energy. This allocation of investment to energy, in itself insufficient to keep up with rising energy demands, also reduces investment in other sectors, thus further straining many economies and limiting strategic economic growth objectives.

3.1.6 Inefficiency in energy supply and end-use in developing countries

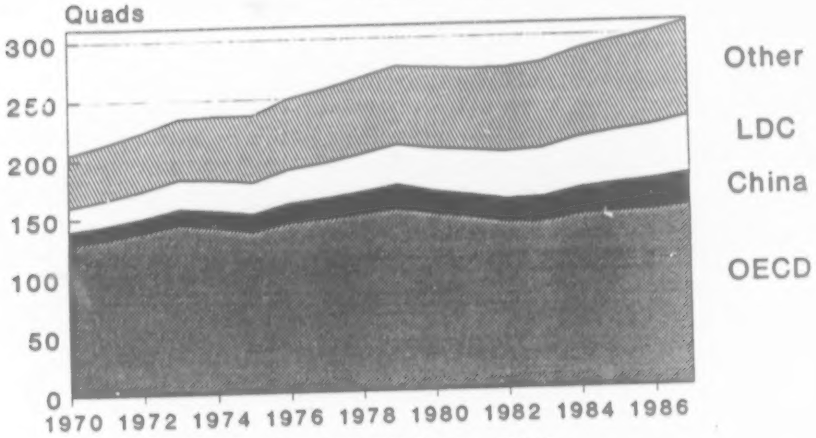
One way to reduce the amount of investment required for power system expansion and for development of other resources, or to reduce expenditures on energy imports, is to improve the efficiency of energy production and end-use. The inefficiency with which energy is used and, in

---

[3] U.S. Agency for International Development, *Power Shortages in Developing Countries: Magnitude, Impacts, Solutions, and the Role of the Private Sector*, March 1988.

Figure 1

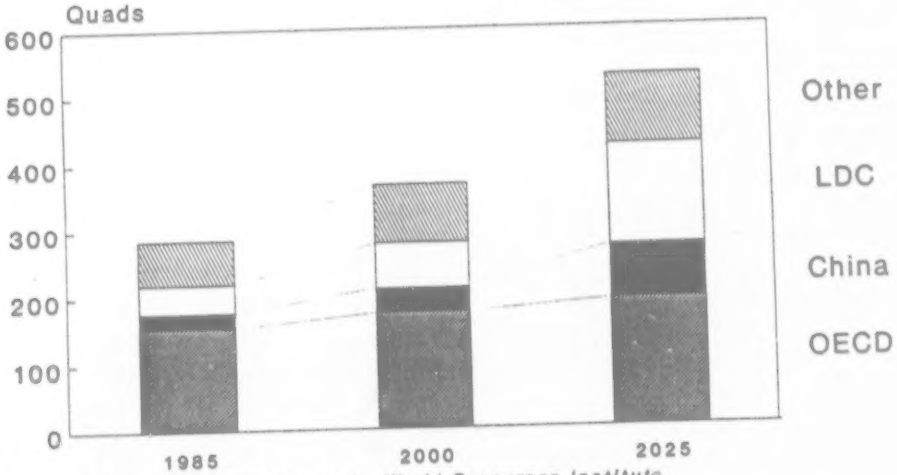
WORLD PRIMARY ENERGY CONSUMPTION 1970-1987



Source: BP Statistical Review of World Energy, 1988

Figure 2

PROJECTED PRIMARY ENERGY CONSUMPTION 1985-2025



Source: Lawrence Berkeley Lab., World Resources Institute

LDC=Africa, Middle East, Asia(except Japan & N.Korea) & Latin America
Other=USSR, E.Europe, N.Korea, & Cuba.

the case of electricity, produced and distributed, has accelerated growth in energy consumption in many developing countries. This inefficiency is the result of many factors: the prevalence of old equipment (often used equipment purchased cheaply from wealthier countries) and processes, lack of maintenance, poor management, lack of information or expertise, and in many cases, energy pricing policies that provide little incentive for more efficient energy use. Some of these problems are due to lack of capital for investment in new equipment and shortage of skilled human resources.

An example of inefficiency in the power sector is the magnitude of electrical transmission and distribution (T&D) losses in many developing countries. These are often over 15% of generation and are over 20% in some cases (Table 3). This compares to T&D losses in the range of 7 to 9% for most OECD countries. The reasons for high losses include extensive use of low voltage distribution networks and theft of electricity.

Table 3

Electrical Transmission & Distribution Losses
(Percent of generation, 1981-85 average)

Pakistan	28
India	22
Thailand	18
Philippines	18
South Korea	12
Japan	7
U.S.	8

Source: U.S. Agency for International Development

Energy is often used inefficiently in industry, transportation, and buildings of developing countries relative to the norm in the industrialized countries. In China, for example, the average energy consumption per unit of output for various industrial products is much higher than that in the U.S. or Japan (Table 4). Another example of a high level of inefficient energy use is industry in Egypt. The typical fuel use per unit of product is 75% higher in glass and in chemicals, 90% higher in cement, and 100% higher in petroleum refining than typical levels found in industrialized countries.[4] Electricity intensity is also much higher than international standards for such manufacturing sectors as glass, ammonia, and metal production as well as food processing. A major cause of this high energy intensity has been historically very low energy prices.

The overall impact of improving the efficiency of energy production and use could be substantial. In the power sector, the AID study estimated that improvements in electricity generating efficiency, sharp reductions in transmission and distribution losses, and increases in electricity end-use efficiency could reduce the need for additional generation capacity from 1,500 GW to approximately 1,200 GW, thereby saving over $500 billion over the next 20 years.

---

[4] "Energy Conservation and Efficiency Program Design Report (Egypt)," RCG Hagler, Bailly, Inc., April 2 1987.

Table 4

Final Energy Consumption per Unit Product, mid-1980s
(GJ per ton)

	Steel	Synthetic ammonia	Cement clinker	Oil	Paper
China	33	59	5.9	2.8	48
U.S.	-	34	-	-	35
Japan	23	-	3.5	2.1	-

Source: Tsinghua University, Beijing, China

3.2 Developing Country Problems and Perspectives

Developing countries exhibit tremendous diversity among energy, economic, and environmental problems as well as resources to deal with these problems. While the developing nations share the problems of low average income and inadequate industrial plant, technological capabilities, and infrastructure, their particular situations (from both their own and the U.S. perspectives) are highly varied. Any attempt to deal with them from a monolithic perspective will lead to oversimplification and misinterpretation. To better understand their energy problems, it is useful to place them in several groups that face similar issues with respect to energy.

3.2.1 Oil Exporters with Large Reserves Per Capita

These are the oil-rich countries of the Middle East. While many of these nations are typically no longer classified as developing countries (e.g., by the World Bank), they share many problems with them and continue to be of importance to the U.S. because of their vital role as oil suppliers and their importance to U.S. security interests.

Much of their attention is devoted to oil supply issues, including oil prices, market share, instability in international oil markets, and downstream investments in oil. With the decline in oil prices, these countries (e.g., Saudi Arabia) are presently struggling to maintain efforts to diversify their manufacturing and industrial base. Rapid growth in electricity demand, particularly for air conditioning, has led to shortages of peak power. Subsidized prices for electricity contribute to inefficient use. Development of natural gas resources, combined with their use in efficient gas turbine technology, has the potential for providing new sources of power.

3.2.2 Oil Exporters with Small Reserves Per Capita

These countries are geographically diverse. Examples in Latin America are Mexico and Venezuela; in Africa, Egypt and Nigeria; and in Asia, Indonesia. The major issue is concern over declining availability of oil for export and, thus, reduced oil revenue in the future. Solutions lie in finding substitutes for domestic oil use, using energy more efficiently, and diversifying the economy while oil revenues last. There is a particular need for assistance in natural gas exploration and development in many of these countries as the natural gas resource base is generally large. Flaring of natural gas, because of inability to productively use associated gas, is unavoidable unless investments are made to bring gas to domestic markets. Because profits are in local currency, it is difficult to attract foreign investment for this purpose.

Most of these countries are presently saddled with enormous debt problems, making their long-term economic prospects much less promising despite oil revenues. Many have electricity shortages. Most have heavily subsidized fuel prices and face strong political difficulties in removing the subsidies. This has led to very inefficient uses of energy. These countries are now much more open than in the past to assistance in alternative supply technologies and methods to increase efficiency of energy use to have more oil to earn foreign exchange in the short term and to conserve oil resources for the longer term.

3.2.3 Large Developing Countries with Energy Resources

China, India, Brazil, and Indonesia are especially important because of the magnitude of their current or potential energy consumption and their impact on global climate change. China and India are critical because their already substantial use of coal is projected to increase at a high rate. Brazil is noteworthy because of deforestation in the Amazon. Indonesia is currently consuming its large forests and is implementing plans to increase its use and export of coal.

These large countries face the whole complex of energy problems. Key issues include: exploration for oil and natural gas, the development of these and other fuels, improved utilization of biomass resources, improving energy efficiency, and applying a wide range of new energy technologies (for supply and demand applications). Concern about inadequate capacity for generating electricity dominates the capital for energy development issues in these countries. They have experienced rapid increases in residential and commercial electricity demand, which are outstripping (still high) industrial demand growth. Urbanization in these countries is providing greater impetus to electricity demand growth, while subsidized electricity prices (in China, India, and Indonesia) intensify demand growth and contribute to existing electricity shortages.

3.2.4 Low-income Nations with Slow Development

This category includes much of Africa. The energy-related problems of the low-income countries are very serious. Most of these countries have seen continued energy and oil demand growth, even in times of economic contraction and higher energy prices. They have seen their currency devalued against the U.S. dollar during the past decade, which has meant that the cost of imported oil is higher than previously because oil is valued in terms of hard currencies. Energy imports often represent a substantial portion of total export earnings and capital for energy infrastructure is a sizeable portion of total capital investment.

3.2.5 Rapidly Developing Countries

The more rapidly developing countries (e.g., Thailand and Malaysia) and the newly industrializing countries (South Korea, Taiwan, and Singapore) represent substantial opportunities for expanded energy-related trade and joint ventures. Energy-related trade with the newly industrialized countries is already significant with respect to coal, renewable energy technology, and equipment associated with energy supply and use.

3.2.6 Eastern Europe

Some of the centrally-planned economies of Eastern Europe face energy problems similar to those of the more industrialized developing countries and are in fact recipients of development assistance from the World Bank and the UN. As these countries increasingly open their economies to the international market, there will be more opportunities for energy-related trade. Environmental issues and energy efficiency have recently become important topics in Eastern Europe, as a part of the political reforms overtaking the region. Assistance to Eastern Europe from OECD nations to deal with economic, energy, and environmental problems is a new and important topic on the international agenda.

3.3 Summary

Energy growth in the developing countries has been very rapid during the past fifteen years, particularly when contrasted with industrialized countries. The exact mix of problems faced by the different developing nations varies considerably. It is clear, however, that they have very substantial unmet needs. Capital is inadequate and predicted to become an increasingly serious problem, particularly for electric power. The application of the latest energy technology and the R&D effort to make the technology sustainable could help ameliorate this problem. Limited capital and resources must be put to the most efficient uses; technology and knowledge are essential for this task – and they, too, are relatively inaccessible to developing countries.

4. Current Energy Assistance and Cooperation Programs with Developing Countries

Energy assistance for developing countries consists of a variety of activities conducted by a great many parties. The assistance is dominated by lending for power plant construction, but includes technical assistance in many other energy-related areas. The total level of assistance is difficult to estimate. No single source covers all the different types of assistance, and the various organizations do not necessarily have good communications among themselves. It is not uncommon in a developing country for two or more organizations to be undertaking related activities in an uncoordinated manner, although recent years have seen greater efforts at coordination of activities by organizations working in a particular area (e.g. innovative approaches in the power sector, improved cookstoves, and energy research).

4.1 What is being done and by whom?

There are several types of energy-related assistance that are being provided to the developing countries. These include: (1) loans (with repayment terms that vary greatly); (2) grants for energy equipment; (3) technical assistance; (4) training and institution building; and (5) sponsorship of research. The degree of emphasis differs among the various multilateral and bilateral institutions involved in providing assistance. The level of assistance in a recent year is shown in Table 5 for the major institutions.

4.1.1 International institutions

The major players in energy assistance in terms of funds distributed are the multilateral lending organizations that draw on the combined financial resources of the industrialized countries. These are the World Bank (which includes the International Bank for Reconstruction and Development [IBRD], the International Development Association [IDA], and the International Finance Corporation [IFC]), and the regional development banks: the Asian Development Bank (ADB), the Inter-American Development Bank (IADB), and the African Development Bank. These institutions are the lenders of capital for energy facilities and projects for which private-sector capital markets are not adequate to meet the need, and the terms are more favorable than those offered by commercial loans. IBRD loans, which account for the bulk of World Bank loans, generally have a grace period of three to five years; the interest rate is related to the Bank's cost of borrowing. The regional banks operate in a similar fashion. The IDA serves the poorer developing countries, providing interest-free credits with ten-year grace periods and forty-to-fifty-year maturities. The IFC raises financing for private companies and joint ventures, or may take an equity position in a project. Its interest rates are more in line with commercial lending.

The *World Bank's* annual energy lending (including credits from the IDA) has quadrupled from $1 billion in fiscal 1977 to about $4 billion in fiscal 1987.[5] (About one-fifth of total Bank lending is directed for energy.) Besides its traditional lending for specific energy projects, the Bank is diversifying its lending instruments by providing increasing amounts for structural and sector adjustment loans and sector investment loans. Through this means, the Bank has increased its energy policy and advisory role, and is placing greater emphasis on policy and institutional reforms and economic efficiency (especially reform of energy pricing).

---

[5] The World Bank Industry and Energy Department, *Recent World Bank Activities in Energy*, June 1988.

More than two-thirds of the Bank's energy lending is directed to electric power. Transmission and distribution, including rural electrification, now absorb about one-half of the Bank's power lending. The remainder of power sector funds cover generation projects of many types, including rehabilitation. The Bank also funds coal mining projects and a range of oil and gas operations. The Bank is emphasizing assistance for energy supplies for the domestic market, especially for natural gas development.

Table 5

Funding Levels for Major Energy Assistance to Developing Countries

Organization	**Activity**	**$ Million**	**Year**
Loans			
World Bank	power sector loans	3025	FY1987
	oil and gas loans	679	FY1987
ADB	energy project loans	567	1988
IADB	energy sector loans	405	FY 1988
Japan	power and gas loans	1100	FY 1988
W. Germany	energy loans	410	1988
Grants and Other Assistance[*]			
US (AID)	energy projects	130[†]	FY 1988
UN (DTCD)	technical assistance	25-30	1988
UN (FAO)	rural energy assistance	20-30	1988
UN (UNIDO)	industrial energy assistance	5-10	1988
ESMAP	preinvestment studies & training	14	1988

[*] The main organizations not listed are the UN regional commissions and the development agencies of the OECD countries other than the U.S.

[†] To increase to $237 million (est.) in FY 1989.

The *regional development banks* fund a similar range of energy sector activities as the World Bank, though at a lower level. The ADB allocated $567 million in funds for energy projects to developing countries in Asia and the Pacific in 1988, a sharp increase from the $332 million provided in 1987. Similar to the World Bank, the ADB encourages policy reforms among its developing country members. The IADB provided a total of $405 million in loans for energy projects in Latin America and the Caribbean in FY 1988.

Funding by the Banks is dominated by loans for power systems of proven technology where revenue streams are reasonably well-assured. Relatively little money has gone to small energy facilities, to rural energy needs, or to pilot plants of new technologies.

Other multilateral organizations operate more by providing technical assistance and other services rather than large amounts of capital. At least 10 to 15 organizations of the United Nations (UN) are involved in various types of energy assistance. The organizations with the most substantial level of activities in the energy field are the Department of Technical Cooperation for

Development (DTCD), based in New York, the Food and Agriculture Organization (FAO), based in Rome, the Industrial Development Organization (UNIDO), based in Vienna, and the five regional commissions. These organizations have various sources of funding (including crossflow of funds among them), but many of their projects are supported by the *UN Development Programme* (UNDP). As of the end of 1988, UNDP was supporting some 165 energy projects; UNDP's contribution to these projects over their lifetime (averaging about five years) is about $140 million.

The *Department of Technical Cooperation for Development* provides assistance in the exploration, development, and use of most forms of non-nuclear energy. The main areas of DTCD's energy activities are (1) energy advisory services, assessments, and surveys; (2) energy project formulation, implementation, and assistance; and (3) sponsorship of meetings, symposia, and workshops. Its work has led to establishment of energy planning and information systems, discoveries of hydrocarbon resources, organization of petroleum exploration and development institutions, development of geothermal and small-scale hydro power plants, establishment of solar, wind, and biomass demonstration projects, and training programs for scientists, technicians, and managers. DTCD is currently involved in 110 projects in 47 countries; 75 to 80% of these projects are funded by UNDP.

The *Food and Agriculture Organization* is active in energy assessment and planning for rural and agricultural development, fuelwood and charcoal, biogas and gasification, solar and wind energy, and animal power. FAO's approach emphasizes the development of consolidated national programs which include training, institutional, and financial aspects as well as construction and diffusion of physical systems. The *Industrial Development Organization* provides assistance related to improving use of energy by industries in developing countries. The five *regional commissions* support a variety of energy-related projects, some of which involve many countries within a region.

An example of cooperation among organizations in providing energy assistance is the *Energy Sector Management Assistance Program* (ESMAP), which was instituted jointly by the World Bank and the UNDP in 1983 to conduct energy sector assessments, facilitate implementation of energy policy recommendations, and to help stimulate investment. ESMAP carries out energy-related preinvestment and prefeasibility studies in more than 50 countries and provides a wide range of institutional and policy advice to developing countries. The program's activities are organized into two major groupings, one of which addresses institutional, financial, and policy issues in the energy sector, and the other of which focuses on issues affecting energy use and provision in households and rural industries. Support for ESMAP activities comes from a number of country donors (Canada and Europe) as well as the UNDP and the Bank. Over $500 million in projects originally identified under ESMAP activities have been financed by either private enterprise or multilateral and bilateral donors.

The *European Economic Community* (EEC) also provides energy assistance to developing countries. This includes grants for purchase of equipment manufactured in EEC countries and technical assistance in various areas.

The *International Energy Agency* sponsors the Energy Technology Data Exchange (ETDE) and the Center for the Analysis and Dissemination of Demonstrated Energy Technologies (CADDETT). Both of these programs facilitate technology transfer by disseminating information about energy technologies. The *International Atomic Energy Agency* exchanges information dealing with nuclear science, technology, and civilian power through the International Nuclear Information System (INIS). These programs, while not directed at developing countries, are open to their membership.

4.1.2 Bilateral assistance

In addition to the multilateral programs described above, most of the industrialized countries are directly involved in energy assistance to developing countries. These are usually carried out by a single development assistance agency, but other agencies may also be involved in activities such as trade promotion. With some exceptions, most of these bilateral programs are at a lower dollar level than for the multilateral organizations. Except for the program run by Japan and West Germany, they tend to be more oriented toward direct assistance as contrasted with lending.

Particular programs range from resource/technology assistance, technology transfer assistance, training, assistance for energy planning, and concessionary arrangements for energy commodity purchases. The target of energy assistance by bilateral agencies is more likely to be the rural sector than is the case with the loans from the Banks. Often, assistance is tied to purchase of equipment manufactured in the donor country (AID is a notable exception to this rule). In many cases, a country's programs pay special attention to certain countries or regions (e.g., the U.S. to Egypt and Pakistan, France to French-speaking Africa, Japan to Indonesia). Japan has made a recent commitment to increase its development assistance, but it is not yet known what this commitment will mean for energy sector programs. (U.S. activities are described below.)

4.1.3 Other assistance

A number of nongovernmental organizations (NGOs) offer energy assistance to developing countries. This includes foundations and other philanthropies, voluntary groups, and research centers. The activities of these groups are widely varied — from analysis to grants, training, and field technical assistance — and difficult to document in terms of overall emphasis and funding levels. In many cases, however, relatively inexpensive programs of this type have had substantial impacts in particular localities.

4.1.4 Energy research relevant to developing countries

Various international and national organizations sponsor research that is targeted to developing country energy needs. This includes research on policy issues, development of analytical tools, promising energy technologies, and improvement of project implementation. Some of this research is conducted in the developing countries, usually collaboratively with researchers from the sponsoring country. There is also support for research conducted by developing country scientists, such as that sponsored by the International Development Research Centre in Canada. In addition to research that is directly targeted to developing country energy needs, there is also much energy research sponsored by governments in industrialized countries that is potentially applicable in developing countries, though it is not conducted expressly for that purpose.

4.1.5 U.S. assistance

Turning specifically to the U.S., there are a number of government agencies that provide various types of energy assistance to developing countries. The *Agency for International Development* (AID) provides energy assistance in the form of policy advice, training and institution building, technical assistance, research, and technology transfer. Capital assistance is provided to only a few countries. While AID is involved in several dozen countries, the bulk of energy-related assistance goes to a few countries (especially Egypt and Pakistan). The objectives of AID's current energy activities focus on three primary areas: energy efficiency, the expansion of energy supplies, and the use of cleaner technologies, including both conventional fossil fuels and renewable energy sources. Projects are not centrally managed, but developed by AID missions in individual countries.

AID's assistance is increasingly used to encourage the expansion of private sector energy activities. AID has concentrated considerable effort on reform in the power sector (particularly supporting the development of private power and cogeneration facilities) and is increasing its efforts to provide technical assistance on energy efficiency. AID has also emphasized technology transfer, especially to meet needs for electricity services, by such initiatives as the Program to Accelerate the Commercialization of Energy Research (PACER) in India. Total energy assistance by AID is increasing considerably from FY 1988 ($130 million) to FY 1989 ($237 million), mainly due to power sector assistance in Egypt.

A central Office of Energy (with an annual budget of $10 million) develops new approaches to energy problems and applies these worldwide in collaboration with missions. The areas of its current activities include investment planning in the power sector, energy price reform, energy conservation and demand management, renewable energy applications and training, biomass-fired power systems, household fuels, and resource assessment and development of indigenous fuels. The Office of Energy coordinates the Multiagency Working Group on Power Sector Innovation (MAGPI), an effort designed to improve communication among programs dealing with this area, including activities within the World Bank, the UN, and AID itself.

The U.S. *Trade and Development Program* (TDP) in the U.S. International Development Cooperation Agency finances a variety of planning services for projects in developing countries that are potential export markets for U.S. goods and services. TDP focuses on large public sector projects, including energy development. Its loans in the energy sector amounted to $6 million in FY 1988.

The *Department of Energy* (DOE) is involved in a variety of ways with energy assistance to developing countries. As part of its international energy R&D cooperative activities, DOE currently has over thirty bilateral agreements with developing countries, principally in the newly industrialized countries (Appendix A). Cooperation in fossil energy, nuclear power, renewable energy and conservation has been pursued with several countries, including Mexico, Venezuela, Brazil, South Korea and Taiwan. With Mexico, for example, DOE is currently engaged in cooperative activity in fossil and geothermal energy, while in Venezuela, there is ongoing cooperation in enhanced oil recovery and conservation. For the most part, cooperative energy R&D activities in the developing countries have been limited to exchanges of information and research personnel.

DOE also chairs and staffs CORECT (Committee on Renewable Energy Commerce and Trade), an interagency committee with the mission: "to promote the commerce of renewable energy products and services."[6] CORECT is intended to stimulate markets for U.S. solar and other renewable energy technologies by establishing links between U.S. firms and potential buyers in the developing world (Appendix B). A recent CORECT initiative, the Integrated Electric Utility Program (IEUP), seeks to promote decentralized electric power systems using renewable energy sources for electric utilities in developing countries.

Recently, DOE initiated a program to spur the export of coal-based technology to developing countries. This program, run by the Assistant Secretary for Fossil Energy, is funded at a level of $1.1 million per year (Appendix C). Of this amount, $750 thousand is used to co-fund (with

---

[6] The other agencies include AID and the Departments of Commerce and State.

AID or TDP) prefeasibility studies by U.S. companies to promote international energy trade opportunities. The remainder of the funds are used to support a variety of studies (especially market assessments), conferences, meetings, a directory of U.S. coal and coal technology resources, and similar efforts. The Assistant Secretary (Fossil Energy) chairs the DOE Coal Export Initiative Program, which involves coordination with the major U.S. agencies concerned with trade issues. Recently, DOE concluded an arrangement with Costa Rica for the deployment for clean coal technologies. This arrangement is likely to be the forerunner for others aimed at promoting U.S. energy trade, as efforts continue with other countries in the identification of energy market opportunities.

The DOE *National Laboratories* have emphasized working with individual countries, or regional grouping of countries (Appendix D). Supported by AID and DOE, Oak Ridge National Laboratory (ORNL), has assisted more than 20 developing countries with energy planning, technology assessment, and investment analysis. Its work has given attention to renewable energy options (especially biomass and hydropower), fossil energy options, and efficiency improvement, as well as to such cross-cutting issues as institution-building, energy policy reform, and environmental management.

Lawrence Berkeley Laboratory (LBL), with support from AID, is working with Southeast Asian countries to develop technical capabilities and policies in those countries for the more efficient use of energy in commercial buildings. Recently LBL has started to work with China on energy policy issues related to global climate change. LBL also has an extensive ongoing energy data gathering and analysis effort in collaboration with more than 20 developing countries, supported by international oil companies and the U.S. Environmental Protection Agency.

Argonne National Laboratory (ANL) has been active in energy system planning for the World Bank and others — including model development, country studies, and training — for a number of countries. Current ANL work in this area involves Indonesia, Malaysia, Egypt, Poland, Hungary, and Sri Lanka. ANL has provided technical assistance and training to developing countries in electric system expansion planning and analysis of electricity tariffs. ANL, with DOE support, has been active in coal technology assessments aimed at specific markets in developing countries.

Los Alamos National Laboratory (LANL) has been involved for several years in a substantial program to provide technical assistance to the nations of the Caribbean in the areas of geothermal energy (Honduras, El Salvador, Costa Rica, St. Lucia, and Guatemala), peat development (Costa Rica and Panama), and energy and economic planning (all of the above).

In addition to supporting CORECT's technology assistance efforts, Sandia National Laboratory (SNL) has been involved in transfer of photovoltaic system technology worldwide through its Design Assistance Center. The Solar Energy Research Institute (SERI) provides support for international renewable energy activities through the Wind Energy Technical Assistance Center.

4.2 How well is it working?

Most officials in developing countries concerned with energy matters argue that the overall level of energy assistance is inadequate. Many assistance agencies are reaching a similar view, especially given the recent concern about the relationship between energy decisions in developing countries and the global environment and the opportunities for energy technology exports from the developed countries.

Stepping aside from the question of the overall level of support, there is broad agreement that the current programs of assistance are deficient in at least four respects: (1) in many cases they are not improving the performance of energy institutions in developing countries; (2) they are not directing enough attention to the benefits of energy efficiency improvements; (3) they are not getting improved energy technologies into use to meet developing country needs; (4) they are frequently working from an inadequate technology and knowledge base due to the lack of R&D to adapt energy technologies to developing countries.

The World Bank recently undertook a critical review of its lending program for electric power systems.[7] The results show that over the past decade power sector performance has been in decline, or has been stagnating at unsatisfactory performance levels. A number of factors, largely institutional, are identified as contributing to this situation, including: a trend towards large government-controlled utilities with undue interference by the government in utility operations, ineffective planning, inadequate maintenance, and prices that for social reasons do not reflect the cost of electricity production. The report also notes the lack of balance between loans for new power plants (too high) versus funds to increase transmission and distribution performance and to improve performance of existing facilities. A series of recommendations are made for improving performance, and in particular the efficiency with which electricity is generated and utilized.

4.3 Conclusions

There are many agencies that are assisting developing countries with their energy problems. Traditionally, this assistance has been directed at energy supply technologies, with particular emphasis on the power sector. These emphases are changing: within the power sector, more attention is being given to reducing transmission and distribution losses and to increasing rural electrification. In the past several years, increasing attention has been paid to energy efficiency programs. Many of the lending agencies are promoting energy policy reforms, especially pricing.

Some observers believe that these changes are taking place much too slowly. Others disagree. Virtually everyone, however, agrees that the energy problems of developing countries are becoming less tractable for them and more significant for industrialized countries as well.

It is useful to put the energy assistance to developing countries in perspective. We have identified annual loan activities, mostly for electric power, of about $6 billion per year. Including some bilateral and multilateral sources that we have not yet uncovered, the annual loan package may be on the order $10 billion. This is contrasted with an annual investment in the electricity system alone of $50 to $60 billion per year, and an estimated need for twice that amount for power. (This is not including investment requirements of other energy supply sectors or for end-use efficiency improvements.)

We have identified technical assistance for energy on the order of $200 to $300 million per year from the AID, the United Nations organizations, and ESMAP. If one includes assistance from other countries and the technical support often derived from portions of the loan funds, the total is perhaps $500 million per year. This may be contrasted to the annual commercial energy costs of about $450 billion per year for developing countries. Thus, the assistance is on the order of 0.1% of total energy expenditures. It is not surprising that assistance from others has thus far made only limited contributions to solving energy problems in developing countries, considering the disparity between the magnitude of the problems and that of the assistance provided.

---

[7] "A Review of World Bank Lending for Electric Power," The World Bank, March 1988.

5. Technology Transfer and the Need for Energy Technology RD&D

5.1 Overview

The energy technology choices being made by developing countries are important to the United States from the perspectives of (1) world energy availability and price, particularly for oil, (2) potential markets for U.S. energy and energy technologies, and (3) global environmental concerns associated with increasing energy use. The objectives of both the U.S and the developing countries can be addressed through clean, efficient, and economic energy supply, distribution, and end-use technologies. The purpose of the present section is to focus on the role of technology transfer and energy technology research, development, and demonstration (RD&D) in this overall context.

From the point of view of the U.S. national interest, a major objective is to get appropriate technologies—on both the energy use and energy supply sides—developed, adapted for developing country applications, and transferred into widespread use. A number of barriers and constraints must be overcome for this to be fully achieved. For example:

- In many countries, institutions for making and implementing decisions about energy technologies are poorly developed.
- The policy environment for energy technology decisions is often an impediment in trying to meet energy needs for development. For example, artificially low energy prices or tariffs on imported equipment can discourage the adoption of technologies that would be better for social and economic development.
- In many countries, debt burdens and political-economic uncertainties make it difficult to raise capital for investment in better energy technologies.
- In many cases, the energy technologies that are currently available are too expensive, too complicated, or not adequately adapted (eg., requiring frequent and complex maintenance, not able to be integrated with unstable power systems, needing highly trained operators) for developing country conditions.
- In some cases, the commercial viability of otherwise very promising energy technologies has not yet been demonstrated, and there is no apparent way to arrange such demonstrations.
- In general, the mechanisms for transferring technology-related information to and from developing countries are inadequate. Key decision-makers in the countries do not know enough about technologies that could help them, and we do not know enough about their special needs and perspectives.

5.2 Approaches to Technology Transfer

Strategies for overcoming these barriers often have to be developed on a country-specific basis. Several of the programs noted in §4 are demonstrating ways of overcoming them. For example, AID's Program to Accelerate the Commercialization of Energy Research (PACER) is a major initiative to improve the flow of information about innovative technologies to the power sector in India; and the Multiagency Working Group on Power Sector Innovation (MAGPI)—established with AID's encouragement—is helping to coordinate strategies for assistance and investment in a number of countries. DOE's CORECT Program has examined rural village electrification in the Dominican Republic, based on photovoltaic technology, to see how financial and skill barriers can be overcome.

Basically, the process should be straightforward although its effective implementation requires considerable effort and perseverance. A technology is developed or adapted which makes sense in a developing country context: it is inexpensive, robust, and appropriate for the nature and scale of particular energy needs. Local institutions—ideally, local private-sector entrepreneurs—learn enough about it to take the lead in marketing and operating it, helped by a constructive policy environment and appropriate technical and financial assistance from outside. The early applications are successful enough to encourage others, both within that country and elsewhere, and the technology becomes a significant self-sustaining part of the country's energy system.

One example of such a process at work has been the spread of energy-efficient cookstoves in Kenya. There, a collaboration between AID, the Government of Kenya, and others developed an improved stove—the Kenya Ceramic Jiko (stove)—which reduces charcoal use for cooking by 15 to 40 percent.[8] Local entrepreneurs have found the stove profitable to manufacture and sell; and current sales are estimated at 124,000-140,000 per year, with competition in the marketplace driving down the price of the stove. As a result, the consumption of wood resources in Kenya is being reduced, energy services are being provided more cheaply and efficiently to Kenyan households, and jobs have been created for Kenyan citizens.

A number of successful activities in transferring energy efficiency technology (both hardware and expertise) have taken place in recent years. As a result of AID industrial audit programs, investments have been made in several developing countries to reduce waste in existing industries. For example, more than 70% of energy audits undertaken through AID programs in Jordon have been implemented, leading to local investments of $12.3 million in energy conservation measures with an estimated annual savings of $9.7 million.[9] Similarly, AID programs to achieve industrial energy efficiency in Pakistan and load management in Costa Rica have resulted in high rates of implementation of recommended efficiency measures and rapid paybacks.

Three additional examples provide illustrations of the variety of approaches that can lead to successful technology transfer. AID has sponsored a project operating simultaneously in Indonesia, Malaysia, the Philippines, Singapore, and Thailand on energy efficiency in commercial buildings.[10] Its objectives are to establish building energy research capabilities in these countries and to support the development of national policies to bring about efficiency improvements. This project, by altering the policy environment in these countries, will foster the introduction of new technologies in commercial buildings, which consume 35% of total electricity generated in the region.

A second example is an innovative AID project in the Philippines, entitled "Technology Transfer for Energy Management" (TTEM), which is directed at supporting demonstrations of technology for energy efficiency in industry and buildings. This $5 million dollar program integrates a technical assistance effort (to assist in the choice and installation of technologies and to monitor the performance of the demonstrations) with a loan program. This is a unique effort to create an environment in which local businesses pay the cost of the demonstrations, but two types of incentives are provided: favorable interest rates on borrowed capital and technical assistance in carrying out the demonstrations and monitoring their performance.

---

[8] H. G. Jones *"et al.,"* *"Energy Efficient Stoves in East Africa,"* ORAU and ORNL for AID, October 1988.

[9] "Energy Conservation and Efficiency: Activities and Achievements Worldwide," H.C. Bailly, June 21, 1989.

[10] "ASEAN Buildings Energy Conservation Program," Lawrence Berkeley Laboratory, March 1988.

A third example is the considerable effort that has gone into finding appropriate markets for U.S. photovoltaic systems. In addition to CORECT, the U.S. government has supported design assistance activities in a variety of countries to provide the technical knowledge to implement photovoltaic technology. This has resulted in both opening markets for U.S. industry and benefiting developing countries, for whom photovoltaic systems are often excellent matches for energy needs in remote areas.

These successes notwithstanding, many of the best examples of the process in action often involve non-U.S. technologies. For technology developers and lenders from such countries as Japan, France, and Denmark, close cooperation between the public and private sectors gives them a competitive advantage over U.S. manufacturers and vendors. For instance, the concessionary financial arrangements they can offer are often impossible for U.S. vendors to match. Moreover, many observers of energy activities in developing countries have concluded that (with a few exceptions, such as photovoltaics and windpower) U.S. manufacturers have often paid less attention to developing specific technologies for developing country markets than have our competitors from other countries.

5.3 The Need for Energy Technology RD&D

Even where it is working, the process of energy technology transfer to developing countries appears to be leaving some critical gaps unfilled in the portfolio of energy technologies available to developing countries. For example, a country or a lender needing to generate electric power at moderate or larger scales (say, 100 MW or larger) and looking for realistic alternatives to fossil energy or hydropower will look in vain. (Nuclear power is an option for only a few developing countries at the present time.) Similarly, a country or a lender wishing to provide affordable refrigeration services to a developing country without increasing global chlorofluorocarbon (CFC) emissions will find nothing currently available.

These considerations lead to a recognition of the importance of energy technology research, development, and demonstration for developing countries. Such energy RD&D is not the present responsibility of any agency of the U.S. government, nor of any other institutions involved significantly in energy assistance to developing countries. Energy RD&D needs lie in four related areas:

(1) *Adapting available technologies*

Many seemingly attractive technologies are already available, but are not being used because the technologies need to be adapted to developing country conditions. Typically, for example, equipment needs to be able to operate with minimal maintenance and to withstand fluctuating voltages in power grids.

(2) *Developing new or improved technologies to fill gaps in the portfolio of options*

Although the energy technology portfolio has been considerably enhanced by the energy R&D investments of the 1970s and 80s, there remain a number of gaps which limit the choices available to a developing country. In the case of electric power generation, as discussed above, there is a great need for alternatives to fossil-based power and more efficient fossil energy conversion.

(3) *Demonstrating innovative technologies*

Innovative technologies, whether adaptive or new, need to be demonstrated at a sufficient scale to establish operating parameters and costs so that the countries and lending institutions will consider the technologies to be commercially viable. As noted in §4, lending institutions tend to be conservative by nature and, in addition, do not fund the development and demonstration of innovative technologies.

(4) *Establishing and improving in-country energy R&D capabilities*

In-country energy R&D capabilities can help the country (1) evaluate and adapt imported technologies and (2) make effective use of other R&D being conducted in the country. There are often R&D projects that are best done using capabilities in developing countries. Finally, technology transfer and commercialization are often aided by the active involvement of in-country researchers.

An obvious problem with adapting existing technologies or developing new ones is the location-specific nature of many energy applications. Attempting to adapt or develop technologies for 70 or 80 different country situations would be unrealistic. However, criteria could be developed to help establish priorities. China and India, for instance, include nearly half of the world's population and account for a major share of anticipated increases in CO_2 emissions over the next half-century. Focusing on a few countries such as these would be an efficient way to address U.S. objectives. Another possible approach is to concentrate RD&D resources on a particular product of anticipated widespread applicability.

5.4 Examples of the potential role of energy RD&D

For purposes of illustration, two examples (of many possible ones) are given of situations in which energy RD&D, in combination with addressing institutional barriers, could lead to more effective energy supply and use.

5.4.1 Example: Compact Fluorescent Lamps in India

Incandescent lamps are widely used in villages in India and are a major energy consumer. Compact fluorescent lamps fit in the same sockets as the incandescents, and use only 20% of the power to give the same light output. Increasing demand for electrical energy could be met in part by replacing high-use incandescents by compact fluorescents at an estimated cost of conserved energy that is about 5 times less than the cost of obtaining additional electricity. However, widespread replacement is unlikely to occur until both technical and institutional problems are addressed.

At the individual lamp level, the electronics of the compact fluorescent need to be adapted to handle wider voltage fluctuations that are experienced in the U.S. At the system level, care must be taken to ensure that the electrical characteristics of the lamps do not adversely affect the power distribution system. Technological developments in either the lamps or the power grid could address the system problems. Such developments would need to be followed by a demonstration on a reasonably large scale.

Technological improvements will not be sufficient to assure actual use of compact fluorescents since the price of electricity is subsidized so heavily that the lamps are not economic from the viewpoint of the individual consumer. While raising the price to reflect the actual cost would remove this particular barrier, there is another approach which does not require such a change. The utilities could purchase the lamps and distribute them to consumers for free or a nominal charge. The consumer benefits from reduced electricity costs, and the utility benefits by having power available for other purposes at a cost that is small compared to new capacity.

5.4.2 Example: Integrated Biomass and Gas Turbine Facility

Biomass has been estimated to account for roughly one-third of total energy use in developing countries. However, the use of biomass is often very inefficient (e.g., for cooking), and is at least partially responsible for deforestation. Improvements in the efficiency of current uses have obvious benefits. Further, an argument can be made that a centralized high-efficiency biomass-to-electricity conversion facility could (1) provide electrical power at competitive costs, and (2) encourage the renewable use of biomass (e.g., woody crops) grown in the near vicinity of the facility in order to minimize transportation costs. There are a number of candidate technologies, including direct combustion. Discussed here is an integrated facility which converts biomass to gas for use in an intercooled steam-injection gas turbine.

Turbines derived from jet engines for commercial aircraft have considerable potential to be a high-efficiency and cost-competitive source of electricity. Much of the work to date on turbines coupled to coal gasifiers is directly applicable to biomass. Further, any country with a commercial airport already has the requisite expertise for maintenance of the turbine. Recently, steam injection (with the steam generated from the exhaust gases) has been demonstrated to substantially increase the power output and slightly increase the efficiency, which reduces the cost per unit of electrical power. A next step, intercooling, requires additional development but would again increase the efficiency and reduce the unit costs.

Biomass is inherently easier to gasify than coal, and does not have the complication and expense of sulfur removal. However, technical developments will be needed to match gasifiers to the variety of potential sources of biomass, and to ensure that the gasifier output is compatible with the turbine.

Following the necessary technical developments, demonstrations would be needed to establish operating parameters and actual costs. Great differences exist among different regions in the nature of available biomass, infrastructure to handle biomass, amount and suitability of available land, and the competing uses for this land. Agricultural residues might serve as the source of biomass during the demonstration and early implementation phases.

5.5 Partial list of needed energy technologies and capabilities

Many other examples could be cited of technologies that would address U.S. and developing country objectives and that could be advanced by energy RD&D. Listed here are rather broadly-stated energy needs of developing countries and particular technological options which could address those needs. The list is intended to provide a flavor for the wide range of possibilities, and is not intended to be detailed, exhaustive, or imply a prioritization.

- Moderate-scale (100 MWe, within a factor of two) electrical generation facilities using energy sources other than fossil fuels and hydropower.
    - Geothermal power plants for countries with that resource
    - Advanced gas turbines coupled to coal gasifiers (details in §5.4.2)
    - Modular nuclear power plants that are passively safe and have diversion-resistant fuel cycles
- Efficient and clean coal conversion for electrical generation, particularly for countries (such as China and India) with large coal reserves of varying and/or poor quality coal.
    - Fluidized bed combustion and integrated-gas combined-cycle combustion

  - Beneficiation technology for high-ash content coal
- Small scale (1-20 MW) electrical, shaft power, and combustible material facilities for rural areas, especially those without access to the power grid. Must be simple to install, operate, and maintain.
  - Wind turbines, photovoltaics, solar thermal
  - Biomass converters (gasifiers, briquetting machines)
  - Advanced diesel generators
- More efficient and lower polluting end-uses devices in order to reduce demands on energy supply, and improve health and environment.
  - Cookstoves with improved efficiency and reduced emissions
  - Moderate-sized (as compared to U.S. market) and efficient domestic refrigeration units, preferably with non-CFC insulation and refrigerants
  - Compact fluorescent lamps as efficient replacement for incandescent lamps in high use situations (details in §5.4.1)
- Energy-efficient buildings to reduce demands on energy supply. Residential and commercial building energy use are the fastest growing sectors in the majority of developing countries.
  - Climate-dependent design and construction strategies to reduce intrinsic energy demand, especially for mechanical cooling (shading, natural ventilation)
  - Advanced lighting systems
  - Techniques for control of optical and thermal energy flow through windows
- Improved electrical distribution systems, which are presently prone to fluctuating voltages and significant transmission losses (20 - 30% as compared to about 8% for the U.S.)
  - Electronic systems for load management, dispatching, optimization of distribution network, metering and billing, and detection of losses and thefts in transmission and distribution

These and other energy technology research and demonstration projects need to be conducted in an environment in which energy policy decisions support good energy choices, expertise among planning and technical personnel in the developing countries is adequate, and access to the technologies is reasonably assured. As such, it will be important to undertake training programs, develop and support policy analysis, and assure U.S. private sector participation in the endeavor. Thus, in addition to energy technology RD&D of the types indicated in this chapter, a balanced program with a full range of supporting activities to assure technology transfer is needed. Examples of such activities might include analysis of specific policy options to promote energy efficiency, assistance in electric utility planning, training programs in the application of key energy technologies, and a variety of similar efforts that promote a better informed energy policy and technology community in developing countries. For the specific technologies for which RD&D efforts are actively pursued, involvement of suppliers early in the process, identification of barriers to trade, and assessment of ways of overcoming such barriers needs to be built into the process.

6. A Possible DOE Role

Because it is not the present role of any agency or institution, there is no i major U.S. effort to organize and lead necessary RD&D to supply better energy technologies for developing nations. In the previous sections, we have explained that RD&D is required to adapt existing technologies to the particular conditions in developing countries and on occasion to develop new ones which are presently not available. DOE is the federal agency with the technical experience, knowledge and resources to meet this requirement.

There are many ways a DOE contribution to the national effort might be organized. Certainly, it must be a partnership with other U.S. agencies such as AID, Departments of State and Commerce, with the U.S. private sector, with multilateral lending organizations such as the World Bank and the regional Banks, with the United Nations institutions, with other industrialized countries, and with the governments and R&D communities in the developing countries themselves.

The job is so enormous, however, that priorities must be defined. Below, we suggest some of the considerations for using the expertise of DOE to focus on assisting developing countries in the the selection and application of improved energy technologies.

6.1 Country-Specific Emphasis

The choices some countries make are more critical to the U.S. interests than others. This is certainly true, for example, regarding climate change. The big three — China, Brazil, and India — dominate with respect to present and future CO_2 emissions. These countries are also important to the United States for trade and strategic reasons. A possible strategy is to concentrate technology development and exchange efforts on countries such as these. As noted in the previous section, U.S. technology support should include helping to build in-country RD&D capabilities, training, providing information, helping analyze policy alternatives, as well as conducting relevant RD&D to provide better technologies.

6.2 Technology-Specific Efforts

Some technologies may be very important for many countries. We have provided examples throughout the text of technology RD&D efforts that could provide potentially valuable benefits to developing countries. A careful analysis is needed to establish the areas of energy technology research, adaptation, development, demonstration, and transfer that are likely to yield the greatest benefits. This could provide the basis for initiating programs in several countries and assisting the U.S. private sector in making successful technologies more broadly available to these countries.

6.3 A Comprehensive Information Dissemination System

Developing nations have tough decisions to make, and they are faced with a bewildering set of options and potential purveyors of assistance. The U.S. could provide a one-stop information source, the purpose of which is to provide credible information and tools (such as economic models and technical performance models) for comparative analyses. This system could be tied into all of the organizations and countries active in providing technical and financial assistance on energy. This information function would also assist in setting up joint coordinated and cooperative projects. It might also encourage the development of RD&D specialty institutions in developing countries.

DOE capabilities are such that it could play a lead or support role in establishing such a system, depending on the willingness of other agencies to undertake this endeavor. Whatever agency assumes the leadership, it will be important that all organizations involved in energy RD&D and energy assistance to developing countries participate actively in establishing such an information system.

6.4 The Next Steps

Considering the growing importance of developing nations to oil markets and the global environment, and as markets for U.S. technologies, the topic of energy technologies for developing countries is of growing importance. DOE has substantial capabilities to contribute to solutions of major global energy problems. It does not as yet have a clear mandate, mission, or sufficient programs to become a major player in working with developing countries.

In our judgment, the next step is for DOE, as part of its National Energy Strategy, to reassess its role in providing energy technology RD&D and technology transfer to developing countries. In order to assess these issues, it is appropriate to hear various views on this topic through the public hearing process. Additional efforts to develop more concrete plans will be necessary to establish major new programmatic activities related to energy technologies for developing countries, if the DOE is to play a significant role in this area.

STATEMENT OF
THE AMERICAN GAS ASSOCIATION
BEFORE THE
COMMITTEE ON ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE
ON TITLE III OF S. 341,
THE NATIONAL ENERGY SECURITY ACT OF 1991

March 12, 1991

Introduction

Mr. Chairman and Members of the Committee: The American Gas Association (A.G.A.) is a national trade association comprising some 250 natural gas distribution and transmission companies serving over 174 million natural gas consumers throughout the United States. We appreciate this opportunity to present our views on S. 341, as it relates to energy efficiency.

Title III of the National Energy Security Act of 1991 recognizes the substantial role the federal government can play in supporting demonstration and commercialization activities that improve energy efficiency in the U.S. economy.

The increased activism on the part of the federal government contemplated by the proposed legislation could result in a significant increase in public awareness of the importance and benefits of energy conservation and a dramatic increase in the rate at which new, high efficiency, low emission technologies are accepted in the marketplace.

This testimony will concentrate on three critical issues regarding the federal role:

1). the need to conserve resource energy, regardless of the form in which that energy is delivered to the point of consumption;

2). the importance of opening the Federal Product Schedule governing federal procurement to new, high efficiency, low emission products that have been successfully demonstrated, in either the private or the public sector, and have been tested by a third party testing agency to establish the suitability of their construction and the adequacy of their safety and performance; and, 3). the need to empower the Federal Energy Management Program of the United States Department of Energy to accelerate the application of energy conservation technologies in federal facilities.

Resource Energy Efficiency (Sections 3001, 3002 and 3003)

The primary intent of the proposed legislation is to reduce dependence on foreign sources of energy. This would be accomplished by shifting a portion of our energy consumption from types of energy typically imported to those that are abundantly available domestically. At the same time, such an approach would also reduce U.S. energy consumption per unit of GNP by making more efficient use of our domestic energy resources. Title III specifically concentrates on improvements in the efficiency of energy use in the residential, commercial and industrial markets, including related federal facilities.

Previous public sector and private sector efforts to establish performance standards and performance measuring systems for buildings have dealt with the efficiency of consumption of energy at the customer's site, without regard for the inefficiencies that exist between the point of extraction of the resource energy and point of delivery of the energy to the customer for use. This site based approach, by focusing only on end use efficiency, creates significant distortions in the structure and conduct of energy conservation programs, and can actually result in significant increases in resource energy consumption and consumer energy cost.

This testimony is accompanied by a copy of an American Gas Association Energy Analysis entitled "A Comparison of Carbon Dioxide Emissions Attributable to New Natural Gas and All Electric Homes," which was published by the A.G.A. Planning and Analysis Group in October, 1990. Exhibit 3 of this Energy Analysis describes the energy trajectory efficiencies for natural gas and for electricity generated by burning coal, oil or natural gas. This trajectory encompasses the entire energy use cycle, from the point of resource extraction to the point of use by the consumer. The Energy Analysis indicates that natural gas is delivered to the consumer at an overall efficiency of 91.2 percent, while electricity generated by burning fossil fuels in existing generating plants is delivered to the consumer at an overall efficiency of 26.7 percent. Electricity from new fossil fuel burning electric generating stations would be delivered to the customer at an overall efficiency of 30.4 percent.

To broaden the comparison somewhat, electricity generated hydroelectrically would be delivered to the customer at an overall efficiency of approximately 92 percent, allowing only for losses in the transmission and distribution of the electricity. Electric power produced in nuclear/steam central power stations would be delivered to the consumer at an overall efficiency of approximately 16 percent.

In summary, the U.S. natural gas production, transmission and distribution system is more than three times as efficient in delivering resource energy to the point of use than the electric generation, transmission and distribution system. As a result, it would be necessary for electric end-use equipment to be more than three times as efficient as gas end-use equipment to achieve the same resource energy efficiency.

A simple example will help to illustrate the fallacy of making energy efficiency decisions based on the efficiency of the end-use equipment at the customer's site. The National Appliance Energy Conservation Act of 1987 established the energy factor (EF) as the appropriate measure of the annual efficiency of gas, electric and other water heating equipment for residential and commercial applications. The minimum energy factor for a natural gas water heater with a 40 gallon water storage tank and 40,000 Btu per hour burner was established at 0.54 (a seasonal efficiency of 54 percent). The minimum energy factor for an electric resistance water heater with a 52 gallon storage tank was established at 0.95 (a seasonal efficiency of 95 percent). The rating system would make it appear that the electric resistance water heater was approximately 76 percent more efficient on a seasonal basis than the gas water heater. However, this rating system disregards the relative efficiencies of the gas and electric industries in extraction and delivery energy mentioned above and described in detail in the Energy Analysis.

When the performance of these two types of storage water heaters is compared on the basis of energy delivered to the customer as hot water divided by the energy extracted from the ground to produce that hot water, the resource energy efficiency of the gas water heater is approximately 48 percent. The resource energy efficiency of the electric water heater is approximately 24 percent. Thus, the end-use appliance with a 76 percent higher energy factor (measured at the site) is actually only half as efficient in using energy resources as the appliance with the lower energy factor.

Similar examples exist for other energy end-uses including space heating, cooking and laundry drying.

Therefore, it is absolutely imperative that building energy consumption be measured in terms of the useful energy delivered to the customer for water heating, air heating/cooling, or other uses, divided by the total quantity of energy extracted from the world's fixed resource base to provide that useful energy.

Federal Product Schedule (Section 3101 re: NECPA Section 554)

New products offering improved efficiency and reduced pollutant emissions, like all other new products, enter the market initially at relatively low production volumes and, consequently, at relatively high prices. This is particularly true in comparison with less efficient products already in general distribution. The higher cost of these new products, combined with general lack of consumer knowledge and understanding of the energy efficiency advantages that go along with more efficient or lower emission equipment, significantly complicates the process of introducing these new products and frequently compromises their chances of commercial success.

The existing Federal Procurement System makes it particularly difficult to introduce new technology into the federal sector. New equipment, which may have been successfully demonstrated in the private sector, has difficulty being accepted into the federal product schedule and, consequently, is ineligible for submission in response to government requests for quotation. In addition, the high initial cost of new technology, resulting from low production volume and the absence of significant opportunity for learning curve effects on pricing, typically cannot achieve "lowest and best bid" status.

The extensive and diverse nature of federal government activities could represent excellent early market entry opportunities for a wide variety of new, high efficiency, low emission technologies, if the federal government modifies its procurement system to encourage the adoption of these technologies, despite the fact that they have not previously been demonstrated in the federal sector.

A.G.A. recommends that the proposed legislation be modified to permit and encourage inclusion in the federal product schedule of new, high efficiency, low emission equipment intended for the residential, commercial and industrial markets, if that equipment has been successfully demonstrated in the private sector and has been certified by an independent testing agency as being of suitable construction, safety and performance for application in the private sector. This certification would most typically involve A.G.A. Laboratories, Underwriters Laboratory or the American Society of Mechanical Engineers.

Federal Energy Management Program (Section 3102)

The United States Department of Energy currently supports the Federal Energy Management Program (FEMP), which is charged with developing plans and programs to implement high efficiency technologies throughout the federal government. This program is currently operating with minimal funding and minimal staffing and has so far been relatively ineffective in implementing programs to introduce high efficiency equipment into federal facilities.

A.G.A. encourages the Committee to amend S. 341 to provide an opportunity to empower FEMP to demonstrate new, high efficiency, low emission technologies in the federal sector. This could be accomplished through a variety of different programs involving public/private sector partnerships, including shared savings programs, financial leases funded from operating cost savings or utility funded demonstration programs with contractual definitions of success, and contractual obligations for acquisition of the demonstrated equipment at the conclusion of a successful demonstration.

Energy Efficiency Information (Section 3007)

A.G.A. requests that utilities be explicitly included in the list of organizations to be consulted regarding expansion of the scope of collection of energy use information in the United States, since the utilities can be expected to play a significant role in the collection and submission of this information.

Subtitle C - Utilities (Section 3201 & 3202)

The Act restricts its coverage of utility programs to encourage investments in conservation and energy efficiency resources to electric utilities. The National Association of Regulatory Utility Commissioners (NARUC) is currently working with DOE to study the applicability of Demand Side Management programs and Integrated Resource Planning to gas utilities. There appear to be opportunities for gas utility investments in conservation and energy efficiency resources as well, and these investments should likewise be encouraged.

Conclusion

In conclusion, Title III of the proposed National Energy Security Act of 1991 offers the potential for significant improvement in U.S. energy security through reduction in reliance on imported sources of energy, combined with reduced consumption of all sources of energy as the result of improved structural and equipment efficiency.

The Federal Energy Management Program, if adequately funding and given a statutory directive, offers the opportunity to make the federal sector a significant force in the demonstration of new high efficiency, low emission technologies, as well as the opportunity to collect more detailed information during the demonstrations than is typically possible with private sector demonstrations.

Modification of the requirements for inclusion of new, high efficiency, low emission technologies in the federal product schedule and special consideration for high efficiency, low emissions equipment bid in response to federal requests for quotations would open a very large potential market for these new technologies. This early market could help manufacturers achieve significant production volumes, realizing significant learning curve effects, and could yield valuable data on the equipment. In turn, this will reduce the price of these advanced technologies and, consequently, increasing their competitiveness in the marketplace.

These procedural changes, coupled with an acceptance on the part of the federal sector of the desirability of purchasing and installing high efficiency, low emission technologies, could dramatically accelerate improvements in our national energy security, as well as significant reductions in resource energy consumption and the emissions of greenhouse gases and acid rain precursors.

NATIONAL ENERGY COALITION

April 10, 1991

The Honorable J. Bennett Johnston
Chairman, Committee on Energy
  and Natural Resources
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

In light of the Committee's approaching markup on energy efficiency-related issues as part of consideration of omnibus energy security legislation, S. 341, we would like to apprise you of the views of the National Energy Coalition (NEC) and its more than 130 member companies and associations (see attachment).

The NEC is an ad hoc coalition supporting a comprehensive, balanced, bipartisan energy policy that promotes adequate supplies of energy at competitive prices and advances the global competitiveness of American businesses and their employees. We commend you for your strong leadership on this very critical issue and the many efforts you have taken early in the 102nd Congress to focus attention on the importance of energy security and the need for a cohesive, balanced national energy policy.

Although it is our view that promotion of domestic energy resources -- such as oil, natural gas, coal and nuclear -- should be the linchpin of any national energy policy, we recognize that energy efficiency can make an important contribution to a balanced national energy policy that seeks to enhance energy supply and productivity. In general, it is our view that the most efficient way to encourage energy efficiency investment is to promote a favorable overall investment climate in the economy and to encourage the commercialization of technologies that improve energy efficiency and productivity. In this regard, we feel the federal government has a role to play in energy efficiency through technology transfer and support for high-risk research and development where private sector incentives are inadequate such as the measures in Title IV and Title III (Section 3003). Another positive approach would be incentives to accelerate the scrappage of older vehicles, as provided for in Title XI (Section 11017).

1331 Pennsylvania Avenue, NW
Suite 1500 - North Lobby
Washington, DC 20004-1703
(202) 637-3154
Fax: (202) 637-3182

The Honorable J. Bennett Johnston
April 10, 1991
Page Two

We do, however, strongly oppose energy efficiency and conservation measures that aren't based on market forces or that embrace regulations, taxes and fees that harm consumers and cost Americans jobs. To this end, the NEC would urge the Committee specifically to oppose Title III's mandatory data collection programs (Section 3007); government programs to develop performance standards for new and existing industrial buildings and products; and mandatory requirements to promote the energy efficiency of such things as lighting, industrial motors and pumps, transformers, and other related equipment. Adoption of these and other similar command-and-control energy initiatives, including proposals to dramatically increase CAFE standards, would represent a return to past energy strategies that failed the nation and proved enormously expensive to American industry and consumers.

We hope these views will be of assistance to you and the Committee as you move forward to consider these issues during markup.

Sincerely,

Cynthia Mansfield

Cynthia Mansfield
General Public Utilities
Co-Chairman, Productivity
& Energy Efficiency Subgroup

Gary Walter Griffith

Gary Griffith
Chemical Manufacturers Association
Co-Chairman, Productivity
& Energy Efficiency Subgroup

National Energy Coalition

Representative Membership List *as of*
April 10, 1991

National Association of Manufacturers
Air Conditioning & Refrig Institute
Alabama Power Company
The Aluminum Association
Aluminum Company of America
American Boiler Mfgrs Assoc.
American Coke and Coal Chemicals Inst.
American Electric Power Service
American Gas Association
American Iron & Steel Institute
American Meat Institute
American Mining Congress
American Nuclear Energy Council
American Paper Institute
American Petroleum Institute
American Recreation Coalition
American Standard Inc.
Armstrong World Industries
Associated Builders & Contractors
Assoc. of Home Appliance Mfgrs.
The Atchison, Topeka & Santa Fe RR Co.
Atlantic Richfield Co.
Baker Hughes MWD
Baltimore Gas & Electric Co.
Bechtel Group, Inc.
Bethlehem Steel Corp.
Camp, Barsh, Bates and Tate
Chemical Manufacturers Association
Chevron
Chrysler Motor Corp.
Ch2M Hill
Coalition for Am Energy Security
ConAgra Inc.
CSX Transportation
Degussa Corp
Duke Power Company
Du Pont Corp.
Eastman Kodak Co.
Edison Electric Institute
EDS Corp.
Entergy Services Inc.
Exxon Corp.
General Electric Co.
General Motors Corp.
Georgia Pacific Corp.
Gulf Power Company
General Public Utilities Corp.
Halliburton Company
Illinois Power Co.
Imo Delval Industries, Inc.
Independent Petro. Assoc. of America
International Paper
Kaiser Aluminum and Chemical Corp.
Kansas City Southern Indus.
M.W. Kellogg Company
Kerr-McGee Corp.
Koch Industries, Inc.
Lawrence & Assoc.
Matsushita Elec Corp of Am
Maytag Corporation
3M Company
Mobil Oil Corp
National Coal Assoc.
National Electric Mfgrs. Assoc.
National Ocean Industries Assoc.
National Steel Corp.
Natural Gas Supply Assoc.
The New England Council
Newmeyer & Assoc.
NYNEX Corp.
Occidential Oil & Gas Corp.
Orange and Rockland Utilities Inc
Oryx Energy Co.
Pennsylvania Power & Light
Phelps Dodge Corp.
Phillips Petroleum Company
Pinnacle West Capital Corp.
Porcelain Enamel Institute
PPG Industries
Reynolds Metals Co
Robinson, Lake, Lerer & Montgomery
Rockwell International
Shell Oil Co.
Siemens
Solite Corporation
Southern California Gas Co.
Southern Company Services
Sumner Rider & Assoc.
Sun Refining and Marketing
Texaco Inc.

- more -

Houston Industries
ICI Americas Inc.
Texas Utilities Electric
TRW
Union Carbide Corp.
Unocal Corporation
U.S. Chamber of Commerce
USX Corporation
Washington Energy Company
Westinghouse Electric Corp.
Wunder, Ryan, Cannon & Thelen

NEMA

National Electrical Manufacturers Association
2101 L Street, N.W. Suite 300
Washington, D.C. 20037 (202) 457-8400

Daniel K. Shipp
Vice President
Public Affairs

RGY AND NATURAL RESOU
RECEIVED
APR 25 1991

April 22, 1991

The Hon. J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
U.S. Senate
Washington, DC 20510

Dear Senator Johnston:

This week, the Senate Committee on Energy and Natural Resources continues its markup of S. 341, the "National Energy Security Act of 1991."

Part of this legislation, as proposed, instructs the Secretary of Energy to evaluate electric lights, electric motors and utility distribution transformers, and determine whether energy efficiency standards are appropriate. The domestic companies who make and market these products are members of NEMA, the National Electrical Manufacturers Association, and these comments reflect their views.

NEMA is the leading U.S. organization representing and serving America's electroindustry companies. Its 630 member companies produce a full range of products for the generation, transmission, distribution, control and end use of electricity.

NEMA has solid credentials for discussing energy efficiency. It is the trade association for lighting, motors, transformers, wiring, meters, controls, and in general all the electric power distribution, control and measurement equipment and systems. NEMA standards -- including guidelines for energy efficiency -- are the marketplace norm in the U.S. Through NEMA, companies develop or influence American National Standards and international standards for electrical products and systems. We've studied building and industrial energy use and energy efficiency. In the mid-70s we sponsored a pioneering real-world study of energy consumption in office buildings which led to **Total Energy Management**, still one of the most widely used approaches to energy conservation in existing buildings.

We recognize the legislation under review does not prescribe standards for electrical products. The Department of Energy would be required to study lighting, motors and transformers, and only set efficiency standards if it determined that such standards were found to be practical and cost-effective. NEMA believes that minimum efficiency standards are neither, and that the evaluations proposed in S. 341 would be a waste of government resources.

This is not because we feel energy efficiency is unimportant. Rather, we believe that the marketplace is already satisfying the conditions of technological justification and economic feasibility that must be the foundation of energy efficiency improvement. Where energy efficient products are technologically feasible, they are being manufactured and marketed. And the test of economic justification is being met when consumers buy, install and use energy efficient products and systems.

Minimum energy efficiency standards, on the other hand, fail to recognize the complexity of the purchase decision for these products. An electric motor or a lamp is not an automobile. An automobile is a system, the efficiency of which can be measured in miles per gallon. But electric motors, lights, transformers and other apparatus are components, parts of larger systems whose efficiency is achieved through the interaction of many component parts.

The industry provides voluntary standards for testing and establishing the energy efficiency of these electrical products, and information programs to help consumers understand how to use them most efficiently. The appropriate role for the government is to recognize the value of these voluntary standardization and information programs.

NEMA and its members have discussed these issues with Committee staff, and stand ready to continue these discussions with the aim of producing workable energy efficiency legislation. For further information, please feel free to contact me or Rich Warren of the NEMA staff at (202)457-8426.

We look forward to working with you to create a more energy efficient future for the U.S.

Yours sincerely,

Enclosures

LIGHTING AND ENERGY EFFICIENCY

Comments prepared for the Senate Committee on Energy and Natural Resources by the Lighting Equipment Division of NEMA, the National Electrical Manufacturers Association.

April 1991

Introduction

Light is essential to human existence. It stimulates psychological responses, affects physiological health, greatly influences productivity, and is crucial to visual performance.

Lighting is complex. To reduce lighting to one denominator -- energy savings -- results in serious shortcomings for good lighting. Lighting is not just **quantity**, but also **quality**.

It is the quality of lighting that enables older people to see well enough to perform daily tasks, that ensures consumers that the shoes they buy are the right color, that enables grocers to display fresh meat and produce in an appetizing way.

Lighting affects the environment where it is applied. Glare and flicker can affect the office worker, the shopper, and the warehouse worker. Too little light reduces worker productivity.

To ensure that there is the right color rendition, to create the right amount of light for productivity, and to allow for energy efficiency, there are literally millions of different product varieties.

A combination of current technology, intelligent design, and sound management can reduce power demand while preserving the fundamental elements of good lighting.

A wide variety of technologies are already in the marketplace, falling within three broad categories:

- more efficient lighting components,
- controls, and
- systems applications and management.

LIGHTING EFFICIENCY TECHNOLOGY

Components

The lighting industry as represented at NEMA is constantly working on improved energy-efficient products. In fact, many lighting products lend themselves to energy efficiency as a natural component, unlike many appliances that may only have one general purpose. Efficient lighting products are not a recently discovered phenomenon.

For example, higher efficacy lamps and an array of replacement lamps have been introduced into the marketplace, including compact fluorescent lamps, reduced diameter fluorescent lamps, and improved phosphor fluorescent lamps. Low wattage HID (high-intensity discharge) lamps are replacing incandescent lamps in many commercial applications.

Another component is the electronic ballast that can save up to 25% of the energy typically consumed by fluorescent systems using electromagnetic ballasts.

Controls

Controls offer an opportunity for energy savings up to 50%. Automatic lighting controls operate on three basic principles:

- occupancy sensing (activating lights only when there are people present);
- time and date programs (computerized dim/on/off scheduling); and
- photo sensor dimming (adjusts lighting levels in response to daylight).

Some of the more advanced controls can adjust lighting levels to accommodate lamp and fixture depreciation over the lifetime of the product.

Systems Application

Commercial and industrial lighting is not delivered through individual components (lamps, ballasts, reflectors, lenses or louvers), but by a combination of these products integrated into a single unit. This single unit system (luminaire) configures these components to distribute the light where it is needed at an optimized efficiency. Luminaire designs can now deliver lighting quality and quantity for specific applications and visual tasks.

Luminaires are integrated into the overall building design along with appropriate lighting controls (switches, sensors, dimmers, and so forth) to provide adequate light levels for the task plus energy conservation. Lighting designers have also revised their design criteria priorities to emphasize energy efficiency.

LIGHTING REGULATION

The lighting industry as represented at NEMA has reviewed the following approaches to developing energy efficient lighting.

Component Regulation

Due to the wide variety of lighting applications and the complex interaction of components within a luminaire, the overall system energy usage often cannot be predicted from the individual efficiencies of the lamps, ballasts, and fixtures. Some common examples of the pitfalls of component regulation are given in Appendix A.

Mandating the use of a more efficient component can reduce the overall system efficiency, and therefore be counterproductive. For this reason, component-type legislation should not be supported or endorsed.

It should also be noted that given the number of different lamps and wide variety of applications, regulating components could result in a bureaucratic tangle of exemptions that would be difficult to enforce.

The NEMA Lighting Equipment Division is opposed to any component-based regulation because it can be misleading, ineffective, and counterproductive.

To propose component standards that focus only on saving energy does not encourage the most efficient good lighting in the right application. Without the flexibility that would be allowed with a systems approach, concerns over the lack of architectural and design solutions are raised.

The NEMA Lighting Division is concerned that:

* the use of technologies with higher efficiencies than the standard will not be encouraged.

* new technologies may fall outside the definition of the standard and will not be pursued.

* standards will not be developed for increased equipment efficiency, but only for reduced energy use.

The Division's position is that the most accurate measure of lighting efficiency is not a component approach, but a system approach.

The NEMA Lighting Industry Position--Energy-Saving Strategies

The problem, from industry's point of view, is not the lack of sound lighting design strategies nor the unavailability of energy-saving, yet effective, lighting systems. The problem is one of achieving market penetration by convincing developers, owners, and operators of buildings to use the advanced lighting technologies -- the tools at hand.

Because there is no single or simple solution, the answer lies in a judicious mixture of incentives, education, and, if deemed necessary, total building energy standards.

Incentives

Incentives are usually the least resisted method of promoting change. Many existing electric utility demand-side management programs present excellent examples of successful incentive programs. Encouragement of such programs by the federal government would be appropriate.

For industrial users, the government should pursue policies that encourage investment and incentives for energy efficient products. Incentives may also be introduced to help U.S. industries retool toward the manufacture of energy-efficient lighting products for production and distribution, and to encourage research and development programs.

Education

To promote the advantages of using energy-efficient products, education is required at three levels: the owner/consumer, the contractor/installer, and the designer/specifier. Separate strategies are required for each category.

An excellent example of an education program is the work of the California Energy Commission. The Commission formed a group called the Advanced Lighting Professionals Advisory Committee (ALPAC) and charged them with developing an application handbook that gave guidelines for using today's advanced lighting technologies. A similar technology transfer document could be used on a national basis.

Another example is the National Lighting Bureau's non-profit work in writing and distributing various documents on the benefits of good lighting, as well as energy efficiency guidelines.

A third example is the recent NEMA-sponsored Capitol Hill Demonstration Project. This project is an active project using lighting products to demonstrate both good lighting and energy savings in various offices and rooms of the U.S. Capitol. Preliminary results show savings of up to 35% have been achieved while also improving the visual environment.

The Capitol Hill Demonstration Project Report: "Industry Review of Capitol Hill Lighting--A Report to the U.S. Senate Subcommittee on Energy Regulation and Conservation and the U.S. House of Representatives Subcommittee on Energy and Power," dated October 16, 1989, is included for reference.

Federal funding of both education and research programs is encouraged.

Energy Regulation

Concerns about regulations that could create economic turmoil, reliability problems caused by forced technologies, shortages created by the lack of manufacturing supply capability, and the loss of a strong, competitive U.S. industry to overseas competition due to retooling and other costs over short time frames are major concerns that must be considered in depth before creating any regulation that affects the industry.

If such concerns are addressed and federal energy conservation legislation is deemed necessary, then it should be drafted so that optimum lighting design is not impeded or prohibited. Minimum requirements should be on a system basis and should specify an energy budget based upon the needs of specific lighting tasks. "Whole building energy targets" in kilowatt hours should establish the maximum energy usage allowed. Some existing and proposed standards partially accomplish this objective by mandating a maximum allowable watts per square foot.

The NEMA Lighting Division supports this methodology and endorses the current values specified in the energy standard, ASHRAE/IES 90.1-1989 -- "Energy Efficient Design of New Buildings Except New Low-Rise Residential Buildings."

Such "watts per square foot" standards can be enforced by either building inspectors for new construction and major renovation, or by electric utilities for existing buildings as part of their demand side management programs.

Lighting is a highly visible consumer of energy, and significant energy savings are possible through intelligent lighting design, efficient components and control. At the same time, it is important to remember that lighting regulation must take into account lighting's effect on safety, security, health and productivity.

APPENDIX A

Example 1

An incandescent lamp has an efficacy of approximately 15 lumens per watt (lpw). A fluorescent lamp has an efficacy of four times that of an incandescent lamp. Logically, the use of fluorescent should be encouraged. However, if the application requires light to be projected over a distance, the small filament size of the incandescent lamp achieves a system efficiency that cannot be matched by the much larger fluorescent lamp.

Example 2

A compact fluorescent lamp has an efficacy of 50 to 70 lpw. A straight 4-foot fluorescent lamp has a higher efficacy. However, to regulate only on the basis of lamp energy efficiency ignores the fact that the principal application of the compact fluorescent is to replace incandescent lamps, which consume 3 to 4 times the energy of compact fluorescent.

Example 3

An incandescent reflector lamp like those used for store display lighting is relatively inefficient in terms of lumens per watt. If it were replaced with a more energy efficient "household" incandescent lamp, the result would be wasted light distributed in all directions. The seemingly less efficient lamp is in fact much more efficient in placing the light onto the display where it is needed.

Example 4

An "energy saver" 34-watt fluorescent lamp is not as energy efficient as a 40-watt lamp when considered on a lumen-per-watt basis. One of its prime applications is to replace 40-watt lamps in enclosed 4-lamp troffer fixtures found in many commercial buildings. Not only does it save 6 watts per lamp, it also allows the fixture to run cooler, and allows the system to run at a more optimum efficiency.

Example 5

High intensity discharge lamps are also 3 to 4 times more efficient than incandescent lamps. However, because they have deficiencies such as color rendition, immediate light output, and limited availability in low wattages, serious problems would occur if their use was mandated in all applications that previously used incandescent lamps.

ELECTRIC MOTORS AND ENERGY EFFICIENCY April 1991

Comments prepared for the Senate Committee on Energy and Natural Resources by the Motor and Generator Section of NEMA, the National Electrical Manufacturers Association.

Background

Senate Bill S.341 Section 3009 would direct the Secretary of Energy to reevaluate the need for testing, and labeling and setting mandatory efficiency standards for electric motors. The NEMA Motor and Generator Section believes such a study is unnecessary.

NEMA and its members have long experience and specific expertise in the energy efficiency and application of motor products. NEMA has been a leader in industrial energy conservation, reflected by the widespread acceptance of its standards and guides to selection and use of energy efficient motors. Our goal has been and continues to be affordable energy efficient motor products.

The Department of Energy evaluated electric motors in 1980 to determine the practicability and effects of requiring all or part of certain standard classes of electric motors to meet performance standards establishing minimum levels of energy efficiency. The DOE also investigated the practicability and effects of requiring that each item of equipment in such classes disclose by label the energy efficiency of the article, determined in accordance with test procedures prescribed by the DOE.

The DOE emphasized that the recommendations made in its 1980 Report (Classification and Evaluation of Electric Motors and Pumps) take into account the rapidly changing characteristics of the markets for the equipment studied, and the lack of predictability for certain of those characteristics. They stated these changing characteristics may, in turn, cause the predictability of mandatory standards or labeling to vary. The DOE recommended monitoring those characteristics in the future, as the most cost effective approach to assuring the market penetration of energy efficient motors moves strongly toward that level which is economically justified.

Industry Accomplishments

Consider the accomplishments of the motor industry on a voluntary basis. Motor manufacturers of NEMA have developed voluntary standards for testing, labeling, and defining motor efficiency. In addition, the industry has developed standards for energy efficient motors by defining efficiency levels for this product category. These are state-of-the-art and widely accepted in the marketplace. NEMA and its member companies are actively engaged in information programs to help users properly select and apply motors most efficiently. NEMA publishes the Energy Management Guide for Selection and Use of Polyphase Motors. NEMA has presented seminars and workshops on motor efficiency. NEMA is in the process of developing standards for a new class of energy efficient motors. There is work underway in NEMA to harmonize efficiency standards for all of North America under the Free Trade Agreement. There is also work underway to harmonize North American standards with those of Europe under the International Electrotechnical Commission.

Numerical market penetration is between 15% and 25% depending upon motor size (5.1-125 horsepower) and effective penetration based on higher operating hours for larger motors is as high as 42%. The U.S. Bureau of the Census is likely to include statistics on energy efficient motors in its Current Industrial Report published annually based on recommendations from the NEMA Motor & Generator Section.

Efficiency Levels

The 1980 DOE schedule of mandated efficiency levels for 1990 projected the following:

Horsepower	Efficiency
5.1 - 20	0.900
21 - 50	0.920
51 - 125	0.930

The NEMA Standards for energy efficient 4-pole open motors (most common type of industrial motor) are:

Horsepower	Average Efficiency NEMA Standard
5.1 - 20	89.1
21 - 50	92.1
51 - 125	93.5

A "Suggested Standard for Future Design" shows even higher efficiencies for motors in the 21 - 125 hp ranges.

The industry has responded with voluntary standards that are comparable to the schedule of DOE mandated levels. Competition in the free marketplace has resulted in many manufacturers offering still higher efficiency values. Additionally, new work is underway for a new series of standards that explore possible efficiency increases based on higher inrush current.

NEMA Standards are voluntary. Essentially, all manufacturers follow them and mark their ac polyphase induction motors with a recognizable three-digit efficiency value. NEMA also defines the level which manufacturers must achieve to call their motors energy efficient. Manufacturers have responded competitively with values higher than the NEMA. Over 2000 models of energy efficient motors are available today. These products are advertised, stocked, and offered as the first choice a buyer should consider.

Market Penetration - DOE Standards Program

The DOE Standards Program projected 100% market penetration for energy efficient motors in most cases by 1990. However, based upon application considerations alone, it is not reasonable to assume all motors should be energy efficient.

Duty cycles with less than 1000 hours of operation per year and standby operation are typically not suitable for energy efficient motors. Nor do energy efficient motors save energy or money when they are run at idle speed, are significantly oversized, or drive half their rated load or less. Short duty cycle applications, with repetitious starts and stops, are also not suitable for energy efficient motors. Examples include certain machine tools, torque drives, actuator motors for opening and closing dampers in ventilating systems, emergency fire pump motors, door openers and closers, gear motor drives for filter cleaners, and so forth.

In these kinds of applications, energy efficient motors would save no more energy than standard motor designs and would not justify their additional materials and costs.

There will always be the need for standard motors.

Selection of a motor should be made according to sound engineering practice, significant energy savings, and the cost effectiveness criteria established by the user. Energy efficient motors should only be used where they make economic sense.

Market Penetration - DOE Information Program

DOE projections for market penetration under an Information Program were also too high. Market penetration has been commensurate with the cost of energy and the U.S. economic situation through the 1980's. Although the DOE projected energy efficient lines of motors would penetrate the market at the rate of five percent of sales per year, that projection was based on an analysis of the sensitivity of the benefit + cost ratio and higher projected electricity prices. The DOE projected market penetration rates based on labeling and information programs by 1990 to be as follows:

Information Program

1-5 HP	3.0%
5.1-20 HP	27.7%
21-50 HP	46.4%
51-125 HP	60.6%

Actual market penetration numbers gathered by NEMA reflect the state of the economy during the period 1980-1990:

NEMA Program

1-5 HP	8.3%
5.1-20 HP	15.6%
21-50 HP	24.2%
51-125 HP	28.4%

During that period there were downturns in business, softer investment in capital equipment, relatively low petroleum prices, and a leveling off of electricity costs. In fact the years 1980-1983 were disastrous business years for motor manufacturers. These influences dampened any inflationary forces that would have increased the cost of energy in the '80's and enabled market penetrations to follow the DOE projections.

A very gradual up turn in business began around 1984, and in the last three years manufacturers have reported more and more capital investment in motors. There has been higher demand for energy efficient motor products. One manufacturer now projects market penetrations of three to four percentage points per year even without the existing utility rebate programs or government intervention. Given the adverse market conditions of the '80's, the market penetration energy efficient motors has been reasonable and economically justified.

Recommendations

NEMA motor manufacturers believe the recommendations of the 1980 DOE Report to Congress are still valid in that mandatory standards should not be enacted and any new study would reach the same conclusion. If however, a study is authorized, cooperation between government and motor manufacturers is essential in developing sound energy management programs. NEMA and its member companies are ready to help in any way they can.

RGY AND NATURAL RESOU
RECEIVED
APR 25 1991
WASHINGTON. D.C. 205

NAM
National Association of Manufacturers
H. RICHARD SEIBERT, Jr.
Vice President
Resources and Environment Department

1991 APR 24 AM 12: 02

April 23, 1991

The Honorable J. Bennett Johnston
United States Senate
136 HSOB
Washington, DC 20510

Dear Mr. Chairman:

I am pleased to forward to you the National Association of Manufacturers' (NAM) position on proposed legislation relating to utility demand side management (DSM) programs. This statement is particularly timely as the Senate Energy and Natural Resources Committee prepares to mark up energy efficiency provisions in S. 341.

NAM strongly supports efforts to improve energy efficiency. Industrial electricity consumers and their utilities have made and will continue to make substantial energy efficiency investments, where cost-effective, that can help assure the competitiveness of U.S. industry, improve the nation's energy security, and make substantial contributions to a cleaner environment.

Electric utilities are actively designing and implementing DSM programs throughout the country, tailoring the programs to address their unique local circumstances. NAM believes that federal intervention in this on-going process is unnecessary and opposes any legislative or regulatory attempts to impose federally-mandated standards or requirements on the states.

I hope this statement proves useful as the Energy and Natural Resources Committee markup moves forward.

Sincerely,

Dick

Enclosure

1331 Pennsylvania Avenue, NW
Suite 1500 - North Lobby
Washington, DC 20004-1703
(202) 637-3157
FAX: (202) 637-3182

NAM

NATIONAL ASSOCIATION OF MANUFACTURERS

Position on Proposed Federal Legislation Relating to Utility Demand-Side Management (DSM) Programs

There are several proposals pending before the 102nd Congress that would in essence mandate new Federal standards for the way states implement so-called demand-side management (DSM) programs, particularly DSM programs that target reductions in energy consumption.

NAM strongly supports efforts to improve the efficiency of energy utilization, including conservation. Industrial electricity consumers and their utilities have made and will continue to make substantial investments in energy efficient equipment, technologies, and facilities. Such investments, where cost-effective, can help assure the competitiveness of U.S. industry in domestic and international markets, address the nation's energy security interests, and make substantial contributions to a cleaner environment.

Electric utilities are actively designing and implementing DSM programs throughout the country. Many state public utility commissions also are requiring the evaluation of DSM programs as part of least-cost planning or integrated resource planning efforts. Each state has tailored these programs to address their unique local circumstances. Other states are considering the implemention of DSM programs and deciding if such programs offer potential benefits to the utility customers in those states. NAM believes that federal intervention in this on-going process is unnecessary and opposes any legislative or regulatory attempt to impose federally mandated standards or requirements on the states.

NAM believes that the implementation of cost-effective DSM programs can help assure a reliable and adequate electricity supply at least-cost. However, NAM also believes that electric utilities must not be precluded from meeting future electricity needs with cost-effective supply-side technologies. The ability to profit by increasing sales or decreasing costs is the only appropriate incentive in our economic system that assures the efficient utilization of resources.

NAM supports the following general principles related to the implementation of utility DSM programs:

A. Utilities should carefully determine their resource needs.

  1. Utilities should develop an overall resource plan.

    a. This plan may include both supply and DSM options.

b. The evaluation of alternative supply and DSM options may consider any lost revenues associated with DSM options.

c. The resource plan should not mandate utilities to pursue demand reduction programs when capacity is otherwise available.

d. The utility's resource plan should be developed with the opportunity for public review and approval by its state regulatory commission (PUC).

2. State regulatory commissions may wish to establish guidelines for the design, implementation and verification of DSM programs. However, utilities should retain the responsibility to construct and manage their assets, and implement their overall resource plan.

B. Electricity rates should be cost-based so as to send correct price signals to customers.

1. Utilities and their state regulatory commissions should work to eliminate cross-class subsidies where they exist. Subsidized rates that encourage customers to consume more than they otherwise would consume, will discourage cost-effective conservation behavior.

2. Rates should be designed to maximize the efficient utilization of all a utility's resources, consistent with minimizing its long-run revenue requirement.

3. Where cost justified, rates should be time-sensitive to reflect changes in a utility's costs of generation that may vary by hour, day, month, or season.

C. Customers should have information that helps them improve the efficiency of their energy utilization.

1. Utilities should be encouraged to implement cost-effective customer information programs.

2. These programs may include but not be limited to: direct consumer contacts, targeted advertising, educational workshops and materials, and technical assistance.

D. The actual performance of any DSM option should be verified to assure that only cost-effective programs are implemented.

1. The energy (kWh) and capacity (kW) impacts and costs of DSM programs should be estimated with the same accuracy, as practicable, as estimates of capacity, energy output, losses, availability, reliability and economic life of supply side resources.

2. Utilities may use competitive bidding for the acquisition of DSM options.

E. The recovery of DSM program costs from ratepayers should follow cost-of-service standards.

1. Cost-of-service standards should be applied to the recovery of costs from both demand and supply options.

2. Resources should be evaluated using only actual costs, including the costs required to comply with applicable environmental laws. Regulatory procedures should not internalize social costs (such as environmental externalities) when determining the cost-effectiveness of any DSM or supply option.

F. DSM programs that target industrial ratepayers should be carefully designed to minimize:

1. Adverse impacts on the competitive markets in which industrial ratepayers operate;

2. The participation of customers who would have implemented the demand-side measures on their own initiative; and

3. Subsidization of DSM participants by other industrial ratepayers who previously had implemented demand-side measures at their own expense.

NFRC

National Fenestration Rating Council

BOARD OF DIRECTORS

CHAIRMAN
K. Eric Blatross
National Wood Window
and Door Association
1400 East Touhy Avenue
Suite G-54
Des Plaines, Illinois 60018
TEL: (708) 299-5200
FAX: (708) 299-1286

VICE-CHAIRMAN
Lou F. Masonick
American Society of Heating,
Refrigerating, and Air
Conditioning Engineers, Inc.

ACTING SECRETARY
William J. Anton
American Architectural
Manufacturers Association

TREASURER
Juliette Lang Cohn
Vinyl Window and
Door Institute,
Society of the Plastics
Industry, Inc.

Gregg D. Ander
Southern California Edison

Alan Campbell
National Association of
the Remodeling Industry

Gary Curtis
National Association of
State Energy Officials

Deane Evans
American Institute
of Architects

Raymond G. Gallagher
Primary Glass
Manufacturers Council

Thomas Martin
Sealed Insulating Glass
Manufacturers Association

Steven M. Nadel
American Council for an
Energy-Efficient Economy

James A. Smith
National Association of
Home Builders

ADMINISTRATOR
John D. Rivera/
William C. du Pont
D&R International, Ltd.
962 Wayne Avenue
Suite 750
Silver Spring, MD 20910
TEL: (301) 588-9387
FAX: (301) 588-0854

SENATE COMMITTEE ON
ENERGY AND NATURAL RESOURCES
RECEIVED
APR 19
WASHINGTON D.C. 20510

April 9, 1991

The Honorable J. Bennett Johnston, Chairman
Committee on Energy and Natural Resources
Dirksen Senate Office Building
Room 364
U.S. Senate
Washington, D.C. 20510

Dear Senator Johnston:

As the Chairman of the Board of Directors of the National Fenestration Rating Council (NFRC), I would like to take this opportunity to present our views of the provision of S.341 concerning windows and window systems. I hope our comments are helpful to you as you tackle the herculean task of developing a National Energy Strategy.

Section 3006 of the National Energy Security Act of 1991, S.341, calls for energy efficiency labeling for windows and window systems. It provides for a two year period for the National Fenestration Rating Council (NFRC) to establish a viable voluntary, national fenestration energy rating system. We enthusiastically agree with the assumption made in S.341 that an effective and efficient system to enable consumers to compare windows and to make energy efficient choices should be established. We are proud to report that in its brief existence the NFRC has accomplished more towards standardizing the energy performance evaluation of windows and other fenestration products than any other fenestration group in the past quarter century. For example, this new organization already has unified thermal test procedures. To date, five States have either adopted, or soon will adopt, U-value test procedures established by the NFRC. Test procedures for solar gain, optical properties, air infiltration, and condensation resistance are in the process of being developed.

Giant steps have been made towards the establishment of an evaluation, certification, labeling, and verification program for fenestration thermal performance. Meetings scheduled for April and June of this year will lead to the establishment of a framework for certifying and labeling fenestration products. The NFRC has involved both State and federal agencies in the accomplishment of these tasks. In addition, it has worked closely with the Canadian government to assure that the our rating system will not conflict with a Canadian system, and will allow U.S. manufacturers to market in Canada.

Finally, and perhaps most importantly, the NFRC is the first organization in my memory that has blended a number of different interest groups into a cohesive coalition working effectively toward a common national goal. These include fenestration manufacturers and suppliers, other representatives of the building industry, test laboratories and research organizations, industry and utility associations, government agencies, utilities, and public interest groups. The fenestration industry, including the wood window industry which I represent, has been quite supportive of the Council's mission. This is demonstrated by the fact that a substantial proportion of NFRC's funding comes from its members. However, NFRC could not have accomplished as much as it has without the support of the U.S. Department of Energy and its Lawrence Berkeley Laboratory. Therefore, we support the $750,000 authorization provided for Fiscal Years 1992 - 1993 in S.341. This funding will certainly help us reach our goal of establishing a national rating system by December 31, 1992. We suggest that $250,000 be made available to the NFRC and that DOE allocate the remainder to provide technical support to the Council.

The NFRC is confident that the voluntary, national program it establishes will not only be timely, but technically sound and attractive to the fenestration industry and government entities alike. We intend to keep your committee informed about our progress and invite you to send representatives to our meetings to make their own assessment.

NFRC requests that the Committee consider one change to the proposed language:

> *(a)* ***Development of Program.*** *- Not later than one year after the date of enactment of this Act, the Secretary shall provide financial and technical assistance to~~, in consultation with~~ the National Fenestration Rating Council~~, industry representatives, and other appropriate organizations, provide financial and technical assistance~~ to support the voluntary development of a national window rating program to establish energy efficiency ratings for windows and window systems.* . . . . . .

We recommend this change for several reasons. First, NFRC has become the recognized body for the establishment of a national, voluntary fenestration rating system. It is now looked to by industry and government alike as the forum for establishing such a system. We believe that it is more likely that a voluntary consensus on these issues will emerge if NFRC functions as a clearinghouse for differing views. Second, all of the major fenestration and building industry associations and many of the nation's window manufacturers, utilities, States, fenestration research organizations, and public interest groups are part of the NFRC and have been instrumental in its progress. All other interested parties can join this voluntary organization and also participate in its policy making activities. It is fully intended that these two scenarios will continue.

We would be happy to answer any questions you may have about the Council and its work. If you have any questions, please have your staff call either me or John Rivera, NFRC's Administrator. Thank you very much for your attention.

Sincerely,

K. Eric Ekstrom

K. Eric Ekstrom
Chairman

NASEO National Association of State Energy Officials

March 27, 1991

BY MESSENGER

The Honorable J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
SD-364
Dirksen Senate Office Building
Washington, D.C. 20510-6150

Re: Response to Questions to Richard H. Watson (NASEO)(S. 341) - 2/26/91 Hearing

Dear Senator Johnston:

This letter is submitted in response to your questions to me as Chairman of the National Association of State Energy Officials (NASEO) and Director of the Washington State Energy Office, related to my testimony before your Committee on February 26, 1991 on S. 341.

1) On page 6 of your testimony you state that the Federal investment in State assistance programs such as Weatherization and Schools & Hospitals is "returned many times over". Are there independent studies that estimate the energy savings that have resulted from these Federal investments?

The short answer is yes. For example, we have attached a copy of a January 14, 1988 letter from Peat Marwick Main & Company which is an executive summary of their evaluation report of New York State's Energy Advisory Service to Industry (EASI) through 1987. The EASI program utilized mostly retired engineers to conduct free on-site technical energy audits of businesses with under 400 employees. The business receives a written report detailing the findings, recommendations for energy-saving measures and all appropriate calculations. This program was implemented under SECP and EES and through the study period produced energy savings of $123.8 million, with an average survey producing savings of $25,000. As Peat Marwick stated, "[t]he program was extremely cost effective with a savings to cost ratio of approximately 40 to 1." Last year the National Energy Resources Organization gave the New York State Energy Office their annual energy conservation award for this program. If you would like the complete evaluation please let us know. New York has also completed

Chairman
Mitch Beaver
(Illinois)

Immediate Past Chairman
Charles R. Guinn
(New York)

Vice Chairman
Dr. Donald E. Milsten
(Maryland)

Treasurer
Charles J. Clinton
(District of Columbia)

Secretary
Cherry L. Duckett
(Arkansas)

Doug Culbreth
(North Carolina)

Mark Ginsberg
(Arizona)

Charles R. Imbrecht
(California)

Larry Bean
(Iowa)

Karen Reinertson
(Colorado)

Brad Chase
(Connecticut)

Carol Tombari
(Texas)

Richard Watson
(Washington)

Executive Director
Frank Bishop

Counsel
Jeffrey C. Genzer
Duncan, Weinberg, Miller & Pembroke
1615 M Street, N.W.
Suite 800
Washington, D.C. 20036
(202) 467-6370

Telephone 202-639-8749 Telecopy (202) 783-2247 122 C Street, N.W., Suite 810, Washington, D.C. 20001

evaluations of their Energy Efficient Appliance Rebate Program, Better Buildings Workshop Program and the Demonstration Furnace and Boiler Rebate Program.

I have also attached a March 14, 1991 description prepared by the Illinois Department of Energy and Natural Resources describing their evaluation efforts. I have also attached a June 1988 report prepared in Illinois for their Home Energy Loan Program.

It should be stressed that under the ICP program generally grant recipients are required to submit energy consumption and costs for three years after the completion of the Energy Conservation Measure (ECM).

We are in the process of compiling examples of studies and evaluations that have been prepared examining the effectiveness of these programs. For example, in Pennsylvania a study was prepared examining the effectiveness of an Energy Office-funded project in 24 residences which showed substantial pay-back. In Iowa, the State has made effective use of the federal ICP dollars by expanding the 50% matching fund feature of the program to a loan program, under which the federal dollars fund the technical assistance which is critical to convincing schools to participate in the program. The State pre-qualifies engineers, engages the program counsel and financial advisors, and after a RFP process arranged a master-lease financing program with Norwest Bank which permits the 436 school districts in the state to use pre-arranged forms to obtain financing. This program has been evaluated and has proven cost-effective. There are a myriad of successful examples. We will provide these evaluations when they become available.

We are attaching a summary prepared on June 19, 1989 of the "Best Programs" operated under SECP, EES, and ICP. The summary and the 500+ page document was provided to your staff in 1989. We are presently updating this document and will provide this to your staff in the near future.

While we do not represent the Low-Income Weatherization program we understand that the Department of Energy is in the midst of an evaluation program through Oak Ridge National Laboratory. In addition, evaluations were conducted of these programs (nine federally-supported and two utility-supported) in Michigan, Minnesota, Ohio and Wisconsin. I have attached a recent paper prepared by Jeffrey Schlegel and others, entitled, "The State-of-the-Art of Low-Income Weatherization: Past, Present and Future." This paper indicates that these programs have become more cost-effective during the past five years.

2) Energy Conservation poses a policy dilemma for the Federal government because the States and localities have much of the authority necessary to implement programs, but they object to any direct involvement by the Federal government. Given this dilemma, do you think that it is appropriate for Congress to make Federal assistance in energy conservation contingent on State and local support for Federal Energy Conservation policies such as IRP or minimum building standards?

From 1981 until J. Michael Davis took over as Assistant Secretary for Conservation and Renewable Energy at the Department of Energy the political position of the Administration and the Department was actively adverse to energy conservation programs. Under this scenario, and with the availability of oil overcharge refunds, the States became the clear leaders in promoting programs in this area. This has been especially true in the area of Integrated Resource Planning, which as many as one-half of the states are doing in a very active way at the present time. This has been true in the area of building efficiency standards, where California, Washington, Oregon, New York and many others have enacted very high standards. It was true in the area of appliance energy efficiency standards, where the actions of California, New York, Florida and Massachusetts, helped convince the industry that a higher minimum national standard was appropriate. The States have been working to develop Home Energy Ratings Systems, in places such as Arkansas, Vermont, California, Maryland, North Carolina, Washington, Alaska, Texas, etc.

The federal government has an appropriate role in this area by providing incentives and encouraging states to promote energy efficiency and energy conservation. In addition, a critical need is federal funding support for the SLAP programs and the stress on energy efficiency, which is very important to state legislators and state governmental leaders in encouraging state support. Frequently, legislators ask why isn't the federal government interested in these efforts.

In addition, there is no evidence to suggest that the federal government has more knowledge or has had more success in this area. In fact the evidence is quite the contrary. Thus, it would appear not to be logical to impose such restrictions.

We support continued and increased federal funding for Integrated Resource (Least-Cost) Planning, which assists state public utility commissions in integrated resource planning. Many more states are involved in this activity, which recognizes state-based differences. We also support increased federal support for the SLAP programs, which, especially in SECP and EES, permit states to promote enhanced building efficiency standards.

On the other hand, it would be enormously counterproductive to tie federal conservation funding to states to implementation of the federal "view" of what IRP or building standards should be. Since the federal conservation funds are not that large in a broad view, it would be a perfect excuse for state legislatures who are not interested in such activities to simply say "who cares". This would be adverse to the public and national interest.

As we stated in our testimony, the federal government could be helpful by: 1) establishing minimum efficiency standards for lighting, motors, small air conditioners and distribution transformers; 2) provide funding for technical assistance to establish Home Energy Ratings/Energy Efficient Mortgage Programs; and 3) establish a federal $1 billion revolving loan program for federal facility efficiency improvements. We addressed other programs in our written testimony.

3) You state that oil overcharge money should not be used for SLAP programs. What kind of conservation projects does the oil overcharge money go for? Do you have any estimates on the energy savings to the U.S. as a result of these projects funded by oil overcharge funds?

We did not state that oil overcharge money should not be used for SLAP programs. Our point was, and is, that the oil overcharge refunds are not a substitute for federally-appropriated dollars. The SLAP programs received $557.6 million in FY'79, and were steadily reduced to $200 million during the late 1980's, and finally Congress in FY'91, increased the funding to $247 million. The cumulative reductions in federal appropriations far exceeds the oil overcharge refunds that have been made available, even if we only consider nominal dollars rather than the effects of inflation. In addition, if the FY'79 funding level was maintained today it would provide over $1 billion in FY'91 for the SLAP programs.

In addition, under Title III of the Budget Reconciliation Act of 1986 (the "Petroleum Overcharge Distribution and Restitution Act of 1986"; see, e.g., H.

Rep. 99-1012 (October 17, 1986)), all oil overcharge refunds derived from refined petroleum products rather than crude oil that had previously been sent directly to the states were thereafter used to directly offset appropriations for the SLAP programs. The first distribution under this program of $134 million left only $66 million of federal dollars in FY'87. As the refunds from refined products have diminished over the years so has this offsetting contribution to appropriations. The estimate for FY'92 is on the order of $30 million. Thus, in fact, these oil overcharge refunds are used in the SLAP programs.

In fact, large amounts of oil overcharge refunds have been flowed through the SLAP programs. Under the $2.2 billion Exxon distribution of 1986, the United States District Court for the District of Columbia mandated that these funds be used for the four SLAP programs, including the Institutional Conservation Program (ICP), the State Energy Conservation Program (SECP), the Energy Extension Service (EES) and the Weatherization Assistance Program. In addition, the Court directed that these funds could be used in the Low-Income Home Energy Assistance Program (LIHEAP). The Exxon order followed the example of the so-called Warner Amendment in the early 1980's. The "Stripper Well" settlement in 1987 involving an initial distribution of over $900 million, which governs all future distributions of refunds resulting from crude oil cases (as opposed to refined petroleum product), permits the states to use these funds in the SLAP programs, LIHEAP and programs approved previously by the Office of Hearings and Appeals of DOE.

Our point in the testimony was that essentially all the oil overcharge refunds received thus far have been allocated. See Reports of the National Consumer Law Center. In addition, the vast majority of these funds have been obligated, and most of the money has been expended. Oil overcharge refunds, despite the annual assertions of OMB which are not seemingly affected by the facts, are simply not available to substitute for federal appropriations.

We are attaching reports prepared in 1987 and 1988 on the historical uses of Exxon and Stripper Well funds, detailing a variety of uses of these dollars. The previously cited National Consumer Law Center reports describe additional programs. We are also enclosing copies of a publication entitled Conservation Update, which details a variety of SECP and EES programs, and has been prepared for many years by the Kentucky Energy Office.

A few examples might be instructive on the issue of cost-effectiveness. As described previously, New York State has operated the so-called Energy Advisory Service to Industry (EASI) for many years. In addition to technical energy audits and extensive reports the State coupled these audits and others with low-interest loans (6% for 5 year terms, 8.5% for 10 year terms, adjusted periodically) funded with oil overcharge refunds to produce annual estimated energy savings of millions of dollars. The attached one-page description of some of Oregon's programs, partially funded by federal dollars, partially with oil overcharge refunds and state funds, indicates that the avoided energy costs in that State alone are over $1 billion. As stated earlier, once our complete report is available we will provide it to the Committee.

If we can answer any other questions please do not hesitate to contact us.

Respectfully submitted,

Richard H. Watson

Richard H. Watson
Chairman

cc: Frank Bishop, Executive Director
State Energy Directors
Jeff Genzer, Counsel

COMPETITION IN ELECTRIC GENERATION--ENVIRONMENTAL EXTERNALITIES

Sury N. Putta
New York State Department of Public Service
Albany, New York
October 1989

Use of competitive bidding for acquiring future electric capacity from private producers is becoming an important feature of public utilities resource planning. The Public Utility Commissions (PUCs) faced with utility projects characterized by large cost overruns and project delays believed acquiring future capacity from private developers would reduce risk to the ratepayers and have encouraged utilities to implement competitive bidding to attract projects that benefit ratepayers. Many utilities have issued Requests for Proposals (RFPs) to guide and encourage participation by private power producers. The RFPs provide guidelines for preparing bids and describe methods used for scoring both price and non-price characteristics of project proposals. Some contract features such as price schedule, dispatchability, reliability, project feasibility and availability of fuel supply are transferable into price equivalents and are used by utility planners along with bid prices to rank the bids. Other factors such as the social costs and environmental impacts are not easily transferable into price equivalents and their introduction into the bidding programs has posed difficulties in valuing the bids. New York State has developed specific methods for setting price equivalents of some environmental impacts. This paper discusses the methods adopted by the New York State Public Service Commission.

Consideration of Environmental Factor in Bidding

Environmental externalities of electric power resources are defined as the residual environmental impacts of projects after compliance with environmental standards and regulations. Since the residual impacts of electric power resource options differ considerably and those impacts impose societal costs indirectly, it is believed that consideration of the residual environmental discharges in competitive bidding programs is necessary to offer a level playing field for environmentally clean resources to compete with others and provides bidders with some incentive to minimize total cost (including the societal costs) not just direct cost in designing their projects.

Those opposed to consideration of environmental factors in bid ranking believe that environmental discharges that are acceptable under law have no measurable impact and impose no environmental cost to the society. They argue that consideration of environmental externalities in bidding programs will force the bidders to incorporate controls beyond those required by law to win utility contracts. The cost of power to the ratepayers will increase without any measurable benefit to society. Unfortunately electric resource options are not environmentally benign or even equal despite meeting standards. Environmental discharges from different resources are not equally regulated. Allowable discharge rates differ for different power generation technologies and are based on many technical factors and the geographical location of the sources. Failure to consider the value of environmental differences between projects in bidding programs offers significant advantage to some projects and could lead to selection of suboptimal projects which are not in the best interest of the society. Bidders of some low cost resources could win contracts and reap excessive profits which will not be passed on to the ratepayers affected by the pollutants discharged into the environment.

For example, consider a case in which two bidders propose coal burning power plants in response to a RFP issued by a utility. The first bidder proposes to install scrubbers to significantly reduce sulfur oxide emissions while the second bidder proposes to burn low sulfur coal without scrubbers which barely meets emission standards. In this case it is assumed that the levelized cost of generation to the second bidder is 1.0 cent less per unit of electric power than the cost to first bidder and his bid price is only 0.5 cents less than the price of the first bidder. Further assume that the environmental cost of the excess emissions of the second bidder to the society (affected by those emissions) is estimated at 0.75 cents per unit of power generated. If the environmental cost is not considered in evaluating the bids, the second bidder wins the contract based on his lower price although his profit is 0.5 cents more than the profit of the first bidder for each unit sold. If the environmental costs are considered in scoring and ranking the bids, the second bidder would have to bid at least 0.75 cents less per unit than the first bidder and cut his profit by at least 0.25 cents per unit in order to win the contract. Society would be compensated through a lower price for the damages it suffered as a result of selecting the more polluting bid. This illustration suggests that consideration of the environmental costs along with other non-price and price factors enables the utilities to consider the value of public resources in awarding power supply contracts and thereby minimizing the total cost to the society.

Considering the value of environmental externalities in integrated resource planning or bidding does not force anyone to incorporate environmental mitigations beyond those required in the letter and spirit of national and state environmental policies. Incorporation of externalities in the resource ranking or planning simply requires recognizing that residual environmental impacts have economic values associated with them and that the projects which avoid those residual impacts through innovative methods or additional controls should be credited in the ranking process.

Such a process will encourage bidders or planners of future resource options to consider the value of public resources in their proposals and provide a level playing field and fair process for competition in electric generation and demand side management. Consideration of externalities in this fashion will permit environmentally clean projects--such as renewable energy resources and energy conservation projects--to compete and win contracts with the utilities despite their higher (apparent) price tag.

Scoring of Environmental Benefits or Costs

For the purpose of discussion in this section, a coal plant that barely meets Federal New Source Performance Standards (NSPS) is considered as a base plant and is assumed to possess zero environmental benefit. All other resource options which emit lower air pollution emissions than the base NSPS plant are deemed to possess some positive environmental benefit. With this assumption in place, Figure 1 was prepared to show how various resource options for meeting future utility capacity needs could score based on the inherent environmental characteristics of the fuels used or the technologies employed. As noted in Figure 1, the base NSPS coal plant would score zero for environmental benefit and would be awarded a positive score when additional investment is made for reducing its residual emissions. It will receive a maximum score 'M' when it makes an investment 'I' at which its residual environmental impacts are assumed to be negligible. Any additional investment in environmental control beyond the point 'I' will result in no measurable environmental benefits. A life extension of an existing coal fired plant which has higher emissions than the NSPS plant would invest on environmental controls beyond the point I and a coal fired plant designed with Best Available Control Technology (BACT) having lower emissions than the NSPS coal plant would limit its maximum investment on additional environmental controls to a point well below I to achieve the maximum score on environmental benefit. Figure 2 shows conceptually how various resource options would score based on price alone using the price line 'P' and how consideration of the environmental benefit score along with the price score creates a level playing field for the bidders to score their projects along the line 'L' which is based on total cost to the society.

The value of the environmental benefit score provided in Figure 1 for any resource option depends on the economic cost of its residual environmental impacts which is equal to the actual cost of mitigating the impacts or the cost of additional controls necessary to eliminate its environmental discharges or equivalent amount of discharges at other facilities. Since estimating the cost of mitigation of impacts depend on the specific location of the future source, it would require a significant amount of information on local conditions such as population density, distribution of public and private assets and agricultural practices. It also requires making value judgements on some perceived impacts which are difficult to quantify. Also awarding score based on actual damages avoided could result in compensating sources in urban locations with a much higher amount than actual cost of additional controls needed to eliminate the residual emissions.

For the above reasons, and because the bidding programs allow little time for estimating actual damage costs, New York State adopted, in the first round of utility bidding programs, a policy for scoring the environmental value of residual impacts based on cost of controlling or offsetting the residual discharges. The basic principles which guide consideration and valuation of environmental externalities in bidding programs are summarized below:

- o Environmental externalities are the residual environmental impacts of projects which meet basic environmental standards and regulations enforced by federal, state and local environmental agencies.
- o Economic values of environmental externalities are the values placed by the society on the damages caused and the opportunities lost as a result of construction and operation of the facilities.
- o Price and social cost of environmental externalities of electric power generation are inter-related and that reducing externality costs may increase price of electric power.

- Consideration of externalities costs in the price of electric power promotes fair competition in power generation and offers a level playing field for the bidders to participate in the utilities bidding programs for acquiring future capacity needs.
- Estimation of the cost or value of externalities requires significant amount of time and resources and forces making value judgements on some issues which are difficult to quantify (ex: determining the damage caused by 1,000 tons of sulfur oxides and its economic value in urban areas versus in pristine areas such as national parks).
- Cost of eliminating the discharges of air and water pollutants and cost of mitigating residual land use impacts could be used as a surrogate for valuing the environmental externalities.
- Estimating the mitigation costs of environmental residuals for projects which pass the environmental standards is possible in the bidding programs and using those costs along with bid prices in valuing the bids forces bidders to consider the values of public resources in designing their project proposals.
- Energy conservation projects which reduce consumption of electric energy offer environmental benefit proportional to the value of environmental externalities associated with the amount of electric generation avoided.

Based on cost of controlling air emissions at existing coal fired power plants through a combination of advanced control technologies and low cost controls, New York estimated the economic cost of off-setting the residual air emissions of a base NSPS coal plant. Those control costs are used for awarding the environmental credits to projects based on their residual emissions. The maximum environmental credits for reducing residual air pollutants of a base NSPS coal plant and rationale for those estimates are provided in Table 1. The control costs for the advanced and low cost control technologies are derived from the estimates provided in the New York State Energy Plan (NYSEP).[2] As noted in Table 1, environmental credit for reducing the residual carbon dioxide emissions is limited to 20 percent of cost of low cost control technology. New York State has decided to place this limitation on environmental credit for reduction of carbon dioxide emission by considering the controversy surrounding the need for controlling the CO_2 emissions and the wide disparity between the cost estimates made for control of CO_2 emissions and for damages. However, by proposing an environmental credit for reducing CO_2 emissions, New York had taken a unilateral step in recognizing the social cost of CO_2 emissions. While the 20 percent cost credit appears insufficient for controlling CO_2 emissions from a coal plant, the maximum credit available for a 100 MW plant, as noted in Table 2, appears sufficient at this time to encourage development of alternative fuels or control methods to reduce CO_2 emission in the near future. For water and land use related impacts, New York bidding programs have drawn upon the studies published by Bonneville Power Administration[3] for estimating the costs of residual impacts. Based on the studies on environmental costs and benefits of generating resources, New York adopted the maximum environmental credit of 0.1 cent for water related impacts and 0.4 cents for land use related impacts for each unit of power generated from an NSPS coal plant. While adopting these estimates for water and land use related environmental values, New York recognized the difficulties in estimating those values in the first round of bidding programs and ordered the utilities to fund and participate in a statewide study on environmental externalities to provide better estimates for use in future bidding programs.

Incorporation of Environmental Credits in New York Bidding Programs

Environmental credits or the externality costs adopted in New York State are incorporated in the first round of utilities' bidding programs in two different ways. In some bidding programs approved by the Commission, the environmental credits of the bidders' projects are translated into an environmental score and added to the scores of other factors for ranking the bids. In other bidding programs the environmental credits are used to adjust the bid prices and the bids are scored based on the adjusted prices. In either case environmental credits for the bids are calculated based on the environmental residuals. Translating environmental credit into environmental score requires analyzing the utility's method of scoring price and non-price factors.

Prices quoted by bidders include the cost of environmental controls incorporated and bidders making lesser investments on environmental controls benefit on price score. Therefore, the score for the environmental factor should somehow be related to the score reserved for the price factor in order to permit environmentally cleaner bids to compete with others. For example, if the avoided cost of power to the utility is 5.6 cents per unit and the maximum environmental cost of a base facility is 1.4 cents per unit, then the appropriate maximum score for the environmental factor should be 25 percent (1.4/5.6) of the maximum score allocated for the price factor. Allocation of environmental score in this fashion will place the environmental factor on an equal footing with the price factor and force the bidders to value the public resources in designing their projects based on total costs. The New York bidding programs are currently offering environmental credits based on estimated air emissions from the projects proposed by the bidders as shown in Figures 2-6. For water and land use related impacts, the maximum environmental credit of a total of 0.5 cents per unit of electric generation is distributed among many factors and the bidders' projects are scored using Environmental Scoring Forms (ESFs) which are designed to conform to the environmental perceptions in each utility franchise area. Hence the ESFs tend to be different for each utility bidding program to the extent the environmental attributes on land and water use impacts are weighed differently based on priorities and perceptions attached to the type environmental concerns in the local area. The ESF form adopted for use in one of the New York utility's bidding program (Table 3) illustrates the weights attached to different environmental attributes in that bidding program and permits bidders to self-score their bids. The weights for the air emissions attributes are calculated using the following formula:

Weight W = (Maximum price score/90% of the utility's avoided cost)* (Maximum environmental credit for the air attribute from figure (3-6)/5).

For land and water use attributes, the weights are based on the utility's perspective in its franchise area. As can be seen from Table 3 the utility in this case proposed to weight noise, transmission and solid waste impacts at twice the rate of other attributes.

The New York utilities and the Public Service Commission are eager to evaluate the outcome of the bidding programs which are now just beginning. The end result of the first round of bidding will reveal whether the procedures adopted are working and the expected goals are achieved. Experience gained in the first round will guide the development of future bidding programs.

References:

1. Final Environmental Impact Statement for Niagara Mohawk Power Corporation Supply Side and Demand Side Bidding Program - Case 88-E-242.

2. New York State Energy Plan (1989), Volume VI, Electric Generation and Use - Role of Non Price Factors in Evaluation of Electricity Supply and Demand Options.

3. Quantification and Economic Valuation of Selected Environmental Impacts/Effects - Bonneville Power Administration Contract No. DE-AC79-83BPIN552.

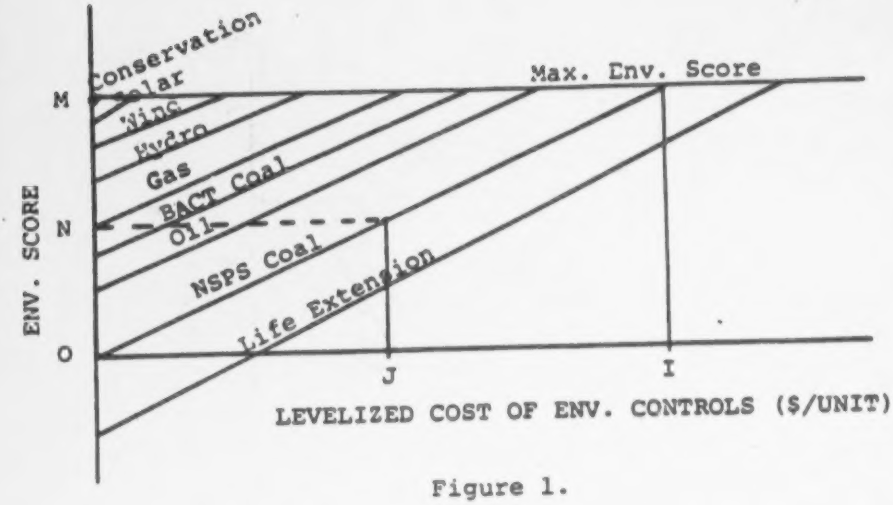


Figure 1.

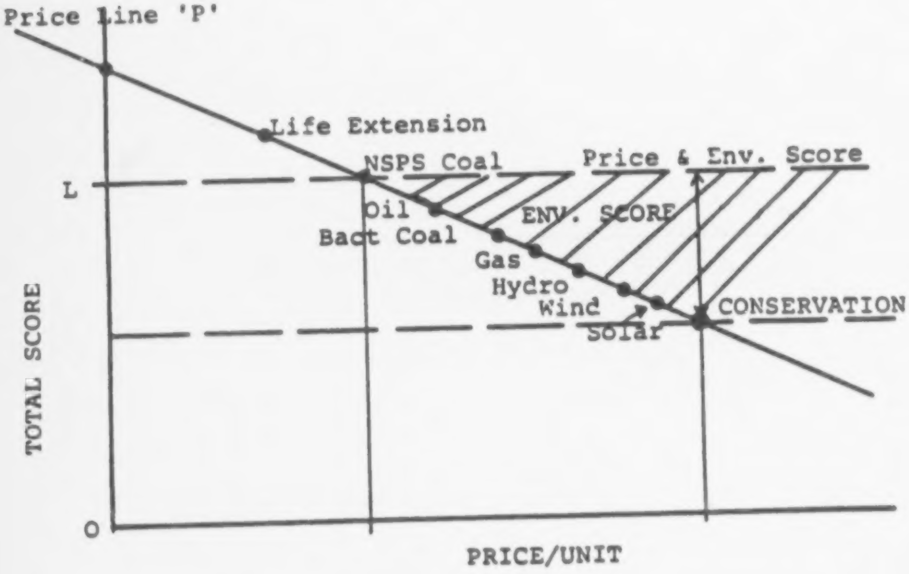
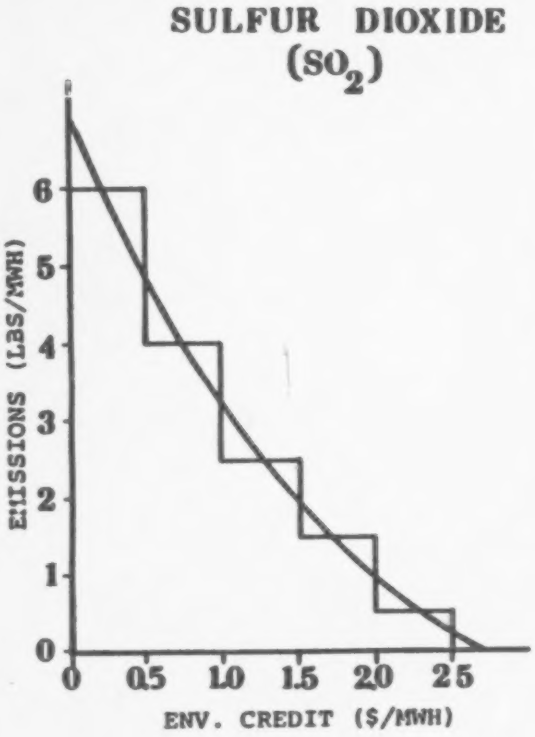
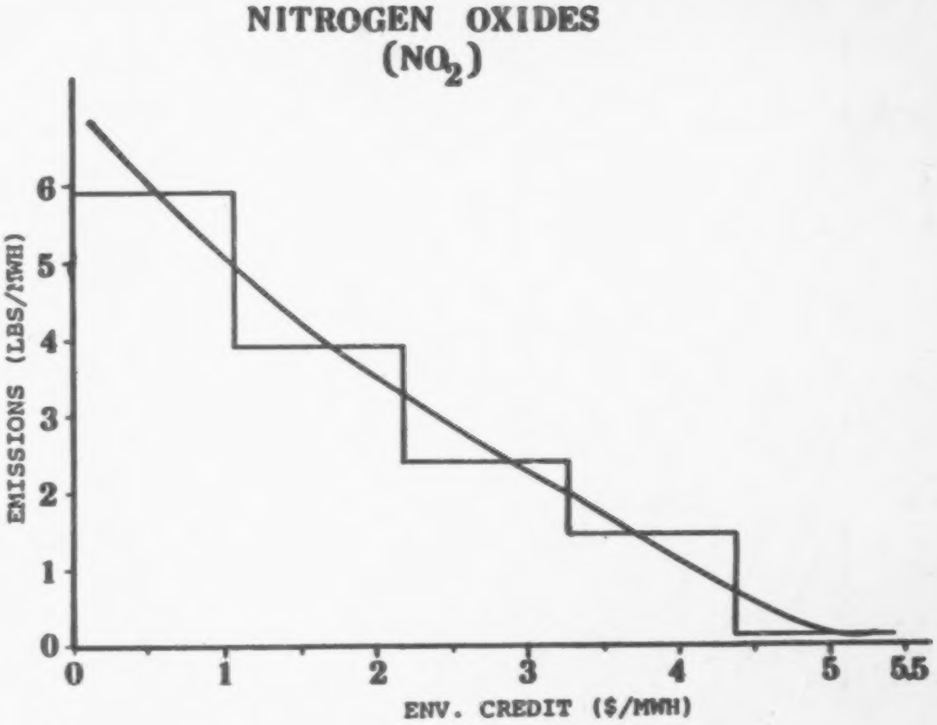


Figure 2.



SULFUR DIOXIDE (SO_2)

Figure 3.



NITROGEN OXIDES (NO_2)

Figure 4.

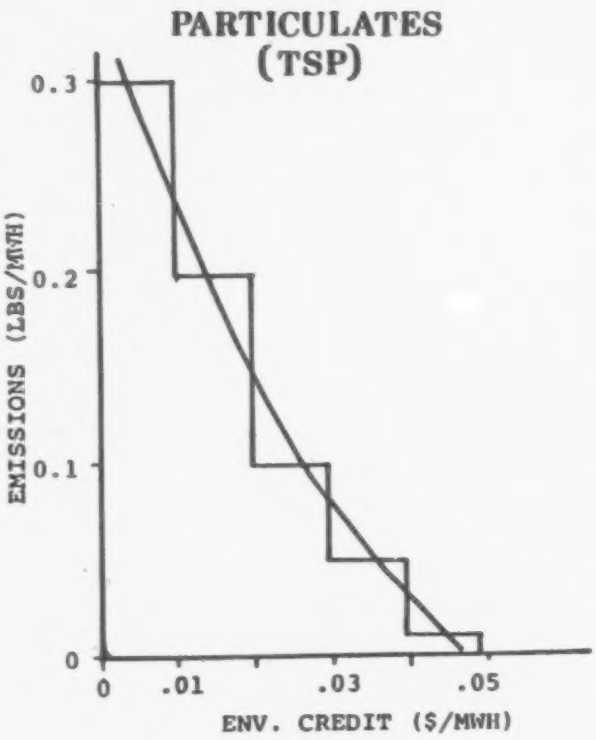


Figure 5.

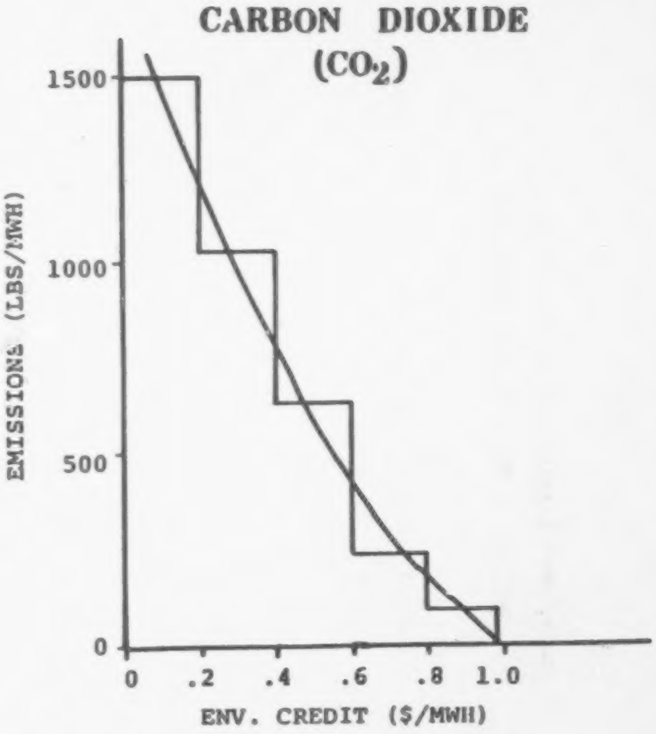


Figure 6.

TABLE 1

ENVIRONMENTAL EXTERNALITIES FOR AIR EMISSIONS ADOPTED IN NEW YORK BIDDING PROGRAM

Pollutant	Control Cost $/ton*	NSPS Coal Plant Emission rate lbs/MWH	Average Cost of Control cents/kwh
SO_2	832	6.0	0.25
NO_x	1832	6.0	0.55
CO_2	1.1	1820.0	0.1
TSP	333	0.3	0.005

* Based on application of 80% ACT and 20% LCT for SO_2
20% ACT and 80% LCT for NO_x
20% LCT for CO_2.

where ACT is Advanced Control Technology.
LCT is Low Cost Control Technology.

TABLE 2

MAXIMUM ENVIRONMENTAL CREDIT AVAILABLE FOR NSPS COAL PLANT (100 MW)

Pollutant/ Environmental Impact	Quantities discharged Tons/yr	Control Cost	Maximum Credit Available for Environmental Improvement* $/year
SO_2	2,197	$ 832/ton	1,827,904
NO_x	1,985	1,832/ton	3,636,520
CO_2	608,135	1.1/ton	668,948
TSP	100	333/ton	33,300
Water Impacts		0.1 cent/kwh	668,280
Land use impacts		0.4 cents/kwh	2,673,120
		Total	$9,508,072

* Based on generation of 668,280 mwh/yr.

TABLE 3

ENVIRONMENTAL SCORING FORM (ESF)

Case 88-E-242 -- Niagara Mohawk

Page 1

Environmental Attributes	Weight (W)	Points (P) 0	1	2	3	4	5	Score WxP
AIR EMISSIONS								
Sulfur oxides (Lbs/MWH)	7	>6	4.0-6.0	2.5-3.9	1.5-2.4	.5-1.4	<.5	
Nitrogen oxides (lbs/MWH)	16	>6	4.0-6.0	2.5-3.9	1.5-2.4	.1-1.4	<.1	
Carbon Dioxide (lbs/MWH)	3	>1500	1050-1500	650-1049	250-649	100-249	<100	
Particulates (lbs/MWH)	1	>.3	.2-.3	.1-.199	.05-.099	.01-.049	.01	
WATER EFFECTS								
Cooling water flow/MA 7CD 10 yr. flow or annual intake as % oflake vol.	1	80-100	60-79	40-59	20-39	5-19	<5	
Fish protection	1	None		Operational restrictions		Fish protection provided	No public water used	
NYS Water Quality classification of receiving water	1	A or better	B	C(t)	C	D	No water use or municipal water/ wastewater treatment utilized	

Case 88-E-242 -- Niagara Mohawk Table 3, Page 2

		Points (P)						
Environmental Attributes	Weight (W)	0	1	2	3	4	5	Score WxP
LAND EFFECTS								
Acreage required (acres/MW)	1	.3-.5	.2-.29	.1-.19	.05-.09	.01-.05	<.01	
Terrestrial	1	Unique ecological historical value		Rural or low density suburban		Industrial area	No land is used.	
Visual Aesthetics	1	Highly visible		Within existing developed area		Not visible visible from public roadways		
Transmission	2	New OH >5 miles	New OH 1-5 miles	New UG >5 miles	New UG 1-5 miles	Use existing facilities	Energy conservation	
Noise (Leq-Background L_{90})	2	5-10			0-4.9		<0	
Solid waste disposal (lbs/MWH)	2	>300	200-300	100-199	50-99	10-49	<10	
Solid waste as fuel (% of total Btu's)	1	0	1-30	31-50	51-80	81-90	91-100	
Fuel delivery	1	New RR spur	Truck & existing RR	New pipeline	Barge	Use existing pipeline	No fuel use	
Kilometers from sensitive receptor area per 6 NYCRR 225.1.1(b)(4)	1	<10	10-39	40-69	70-100	>100	Energy conservation	

Total Score
Max (210)

Weighing Externalities in New York State

New York has taken an important first step in incorporating air, water, and land use related features of energy projects into utility resource selection.

Sury N. Putta

Designing competitive bidding schemes for acquiring future electric capacity raises a number of tricky procedural problems. Perhaps the most difficult is developing a rational system for scoring non-price features of proposals in the bid evaluation process.

Some non-price features such as dispatchability, price schedule, reliability, project feasibility, and availability of fuel supply are fairly readily converted into price equivalents, which are used in the ranking process along with bid prices. Others, however, such as social costs and environmental impacts, are not so easily converted, and attempts to introduce them in bidding programs have caused difficulties.

The New York State Public Service Commission has developed specific methods for setting price equivalents of some environmental impacts. This paper outlines those methods.

I. The Case for Including Environmental Externalities

Environmental externalities are the residual environmental impacts of a resource which remain after compliance with existing environmental standards. These residual impacts differ considerably depending on the type of resource, but all impose indirect costs on society to some degree. Failure to consider these residual impacts in competitive bidding programs may penalize environmentally superior resources and allow bidders of low cost, polluting resources to win contracts and reap excessive profits which would not be passed on to those affected by the pollutants.

Including externalities in bidding programs is a way to create a level playing field for environmentally clean resources and provide bidders with some incentive to minimize the *total* costs of their projects, including the indirect

Sury Putta is a principal policy analyst with the New York State Department of Public Service, which serves as staff to the New York Public Service Commission. He is responsible for developing methods for valuing environmental externalities for the Commission and has written extensively on the subject. Dr. Putta holds a Ph.D. in civil engineering from Colorado State University and a M.A.Sc. degree in mechanical engineering from the University of Waterloo.

costs to society.

To see how externalities could affect a bidding process, consider this example in which two bidders propose coal-burning power plants in response to a resource solicitation issued by a utility:

Bidder A proposes to install scrubbers to reduce significantly sulfur oxide emissions, while Bidder B proposes to burn low sulfur coal without scrubbers, barely meeting emission standards. The levelized cost of generation to B is 1.0 cents per unit of energy less than the cost to A, but his bid price is just 0.6 cents per unit less.

If environmental costs are not considered in evaluating the bids, B wins the contract based on his lower price, although his profit is 0.4 cents greater than A's profit for each unit sold.

If environmental externalities are considered in scoring and ranking the bids, the results would be different. Assume that the environmental cost of Bidder B's excess emissions is estimated at 0.8 cents per unit of energy. To win the contract, B would now have to beat A's price by at least 0.8 cents per unit in order to offset the 0.8 cents per unit environmental cost assigned to his excess emissions. This would require that B lower his bid by at least 0.2 cents per unit, which would cut his profit by at least 0.2 cents per unit. Society would thus be compensated through lower electricity prices for the damages it suffered as a result of selecting the more polluting project.

Incorporating the value of environmental externalities in integrated resource planning or bidding will not force producers to use environmental measures beyond those required in state and federal law. Rather, it simply recognizes that residual environmental impacts have economic values associated with them, and that projects which avoid those impacts through innovative methods or additional controls should be credited in the ranking process. Consideration of externalities in this fashion will permit environmentally clean projects—such as renewable energy resources and energy conservation projects—to compete and win contracts despite their apparently higher price tag.

II. Framework for Measuring Environmental Benefits or Costs

A. Environmental Scores

For the purpose of discussion in this section, a coal plant that barely meets federal New Source Performance Standards (NSPS) is considered as a base plant. All other resources which have lower air pollution emissions than the base plant are deemed to possess some positive environmental benefit; those with higher emissions possess negative environmental benefit.

The base NSPS coal plant scores zero for environmental benefit. If, however, additional investments were made which reduced its residual emissions, it could be awarded a positive environmental score. Its maximum score would be achieved when improvements were made to reduce its residual environmental impacts to the level of an equivalent amount of conservation measures, which are assumed to have negligible environmental impact. Any additional investment in environmental control beyond this point would

Incorporating externalities in bidding programs will have a leveling influence.

result in no measurable benefit. A life extension of an existing coal-fired plant which has higher emissions than the base NSPS plant would have to invest more on environmental controls to attain the maximum score, while a coal-fired plant having lower emissions could invest less to achieve the same maximum score on environmental benefit.

B. Computing Costs of Externalities

The environmental score for any resource option depends on the economic cost of its residual environmental impacts. This can be computed in at least two ways, either as the actual cost of mitigating environmental impacts once they have occurred, or as the cost of additional controls necessary to prevent environmental damage in the first place.

There are several problems with the first method. Since estimating the cost of mitigation depends on the specific location of the source, the first method requires specific information on local conditions such as population density, distribution of public and private assets, agricultural practices, and so on. Difficult value judgments are often involved. In some cases, awarding scores based on actual avoided damages in urban locations could result in much higher costs than simply eliminating the residual emissions with additional controls. This is certainly not a least-cost solution to the problem.

For these reasons, and because bidding programs allow little time for estimating actual damage costs, several states are considering policies for scoring the environmental value of residual air emissions based on the second method—the cost of controlling or offsetting residual discharges.

TABLE 1: Environmental Externalities for Air Emissions Adopted in New York Bidding Program

Pollutant	Control Cost ($/ton)*	NSPS Coal Plant Emission Rate (lbs/MWh)	Average Cost of Control (cents/kWh)
SO_2	832	6.0	0.25
NO_x	1832	6.0	0.55
CO_2	1.1	1820.0	0.1
TSP	333	0.3	0.005
		Total	0.905

*Based on application of 80% ACT and 20% LCT for SO_2
20% ACT and 80% LCT for NO_x
20% LCT for CO_2

where: ACT is Advanced Control Technology
LCT is Low Cost Control Technology

III. New York: A Case Study

A. Computing Environmental Credits

Based on cost of controlling air emissions at existing coal-fired power plants through a combination of advanced control technologies and low cost controls, New York estimated the economic cost of offsetting the residual air emissions of a base NSPS coal plant. The average costs of controls provided in Table 1 were adopted by the New York State Public Service Commission as the values of environmental externalities for four major air pollutants discharged from a NSPS coal-fired power plant.[1] Those control costs are used by the Commission for awarding environmental credits to projects based on the quantities of residual emissions per megawatt-hour of power generation.

For projects whose sulfur dioxide emissions fall between zero and 6.0 lbs/MWh, environmental credits are obtained using Figure 1. For example, a source that produces 6 lbs/MWh of SO_2 emissions will receive zero environmental credit and an energy conservation project which produces no emissions will receive a $25/MWh (or 0.25 cents/kWh) credit, which is equal to the cost of controlling or offsetting SO_2 emissions from a coal-fired power plant as provided in Table 1. Environmental credits for the three remaining major air pollutants are obtained in a similar way.[2]

New York State has also taken steps to include carbon dioxide emissions in this framework. Environmental credits for reducing residual CO_2 are limited to 20 percent of a low cost control technology (reforestation in this case). New York State decided to place this rather low limitation on environmental credits for CO_2 reduction in light of the controversy surrounding the "greenhouse" debate and the wide range of cost estimates made for controlling CO_2 emissions and compensating resultant damages.

However, by proposing an environmental credit for reducing CO_2 emissions, New York has taken a strong unilateral step in recognizing the social cost of this problem. This type of carrot-and-stick approach to reducing environmental discharges appears to be more acceptable to utilities and independent power producers than more heavy-handed techniques.

For water and land use related impacts, New York bidding programs have drawn upon studies published by Bonneville Power Administration for estimating the costs of residual impacts.[3] Based on the studies on environmental costs and benefits of generating resources, New York adopted the maximum environmental credit of 0.1 cent for water related impacts and 0.4 cents for land use related impacts for each unit of power generated from an NSPS coal plant.[4] The water and land use credits when added to the maximum credit offered for air emissions—the 0.905 cents indicated in Table 1—would yield a maximum environmental credit of 1.405 cents/kWh for environmentally benign resources such as energy conservation and some renewable energy resources.

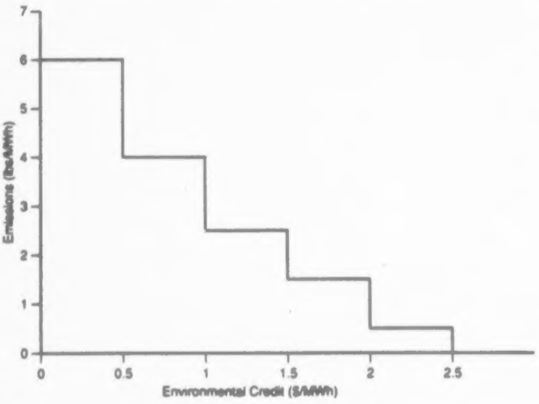
B. Scoring Environmental Credits

Environmental credits for the externality costs adopted in New York State are incorporated in all seven of its utilities' bidding programs, but in two different ways. In some bidding programs approved by the Commission, the environmental credits are used to adjust the bid *prices* and the bids are scored based on the adjusted prices. In other bidding programs, the environmental credits of a project are translated into environmental *scores* which are added to the scores for other factors, and the total scores are used for ranking the bids. In either case, environmental credits for the bids are calculated based on the environmental residuals.

Translating an environmental credit into an environmental score requires analyzing the utility's method of scoring price and non-price factors. In order to allow environmentally cleaner bids to compete with others, scores for environmental factors should be related to the score reserved for the price factor.

For example, if the avoided cost of power to the utility is 6.0 cents per unit and the maximum environmental cost of a base facility is 1.5 cents per unit, then the maximum score for the environmental factor might be set at 25 percent (1.5/6.0) of the maximum score allocated for the price factor. This allocation of environmental scores would encourage bidders to make investments in cost-effective environmental controls, since it would allow them to receive en-

FIGURE 1: Environmental Credits for Sulfur Dioxide



vironmental scores comparable to the score lost on the price factor due to the expense of environmental controls employed. This method of scoring bids would place environmental factors on an equal footing with the price factor and force bidders to value fairly public resources in project design.

In New York, the maximum score allocated for environmental factors is distributed among various environmental attributes in proportion to the maximum environmental credit adopted by the Commission for each attribute.

For air emissions, the score based on the 0.905 cents/kWh adopted by the Commission is distributed to the four major emissions categories; for water and land use related impacts, the score based on the maximum total environmental credit of 0.5 cents per unit is distributed among many factors. These factors and their relative weights are specified on Environmental Scoring Forms (ESFs), which are designed to conform to the environmental perceptions in each utility franchise area. Hence, the ESFs tend to be different for each utility bidding program.

The ESF form adopted for use in one of New York's utility bidding programs,[5] shown in Table 2, illustrates the weights attached to different environmental attributes.[6] The utility in this case proposed to weight noise, transmission, and solid waste impacts at twice the rate of other attributes. Bidders self-score their bids by multiplying the weight (W) times the number of points (P) earned for each attribute, then totalling the scores for each attribute.

IV. Conclusion

The New York utilities and the Public Service Commission are eager to evaluate the outcome of these bidding programs which are now just beginning. The end result of the first round of bidding will reveal whether the procedures adopted are working and the expected goals achieved. Experience gained in the first round will guide the development of future bidding programs. ■

New York has stepped forward boldly to define external values for bidding.

Footnotes:

[1] The costs for Advanced Control Technologies (ACT) and Low Cost Control Technologies (LCT) are estimated based on information provided in New York State Draft Energy Plan (May 1989). The costs published later in the Final New York Energy Plan differ form the costs adopted by NYSPSC.

[2] S. N. Putta, Competition in Electric Generation—Environmental Externalities, N.Y. Dept. of Pub. Serv., Oct. 1989.

[3] Quantification and Economic Valuation of Selected Environmental Impacts/Effects, Bonneville Power Administration, Contract No. DE-AC79-83BPIN552.

[4] Recognizing the difficulties in estimating those values in the first round of bidding programs, NYSPSC has ordered utilities to fund and participate in a statewide study on environmental externalities to provide better estimates for use in future bidding programs.

[5] Final Environmental Impact Statement for Niagara Mohawk Power Corporation Supply Side and Demand Side Bidding Program, NYSPSC Case 88-E-242.

[6] The weight (W) for sulphur dioxide emissions, for example, is calculated using the following formula:

W = [(Max. price score)/(90% of utility's avoided cost)][(Max. env. credit)/5].*

The maximum environmental credit for SO_2 can be found from Figure 1. For other emissions, figures from Putta, *supra* note 2 would be used.

Table 2
Environmental Scoring Form (ESF) Case 88-E-242 Niagara Mohawk Page 1

Environmental Attributes	Weight (W)	Points (P)						Score (W x P)
		0	1	2	3	4	5	
Air Emissions								
Sulfur oxides (lbs/MWh)	7	>6	4.0-6.0	2.5-3.9	1.5-2.4	0.5-1.4	<0.5	
Nitrogen oxides (lbs/MWh)	16	>6	4.0-6.0	2.5-3.9	1.5-2.4	0.1-1.4	<0.1	
Carbon dioxide (lbs/MWh)	3	>1500	1050-1500	650-1049	250-649	100-249	<100	
Particulates (lbs/MWh)	1	>0.3	0.2-0.3	0.1-0.199	0.05-0.099	0.01-0.049	<0.01	
Water Effects								+
Cooling water flow (Annual intake as % of lake volume)	1	80-100	60-79	40-59	20-39	5-19	<5	
Fish protection	1	None		Operational restrictions		Fish protection provided	No public water used	
NYS water quality classification of receiving water	1	A or better	B	C+	C	D	No water use or municipal water/wastewater utilized	
Land Effects								+
Acreage required (acres/MW)	1	0.3-0.5	0.2-0.29	0.1-0.19	0.05-0.09	0.01-0.05	<0.01	
Terrestrial	1	Unique ecological or historical value		Rural or low density suburban		Industrial area	No land used	
Visual aesthetics	1	Highly visible		Within existing developed area		Not visible from public roads		
Transmission	2	New OH >5 miles	New OH 1-5 miles	New UG >5 miles	New UG 1-5 miles	Use existing facilities	Energy conservation	
Noise (L_{eq} - background L_{90})	2	5-10			0-4.9		<0	
Solid waste disposal (lbs/MWh)	2	>300	200-300	100-199	50-99	10-49	<10	
Solid waste as fuel (% of total Btu's)	1	0	1-30	31-50	51-80	81-90	91-100	
Fuel delivery	1	New RR spur	Truck & existing RR	New pipeline	Barge	Use existing pipeline	No fuel use	
Kilometers from sensitive receptor area (per 6 NYCRR 225.1.1 (b)(4))	1	<10	10-39	40-69	70-100	>100	Energy conservation	
							Total Score (210 Max.) =	

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

FILE COPY
Not to be taken away

OPINION NO. 89-7

Original

CASE 88-E-241 - Proceeding on Motion of the Commission (established in Opinion No. 88-15) as to the guidelines for bidding to meet future electric capacity needs of Orange and Rockland Utilities, Inc.

OPINION AND ORDER ESTABLISHING GUIDELINES FOR BIDDING PROGRAM

Issued and Effective: April 13, 1989

TABLE OF CONTENTS

Page

INTRODUCTION 1

SUPPLY BLOCK 5

Amount Put Out to Bid 5

1. Capacity Excluded From Supply Block 5

2. Life Extension Projects 6

Bids 8

1. Capacity Rating 8

2. Measurement of DSM Bids 8

AVOIDED COSTS 10

THRESHOLD CONDITIONS 13

General 13

Notice of Intent 15

Bound Proposals 16

Number of Proposals From One Bidder 16

Entry Fee 17

Security Deposit 19

Site Control 20

Disclosure Requirements 21

1. Financial Information 21

2. Other Proprietary Information 21

TABLE OF CONTENTS

Page

Disqualification of Bids 23
  1. Changes in Representations 23
  2. Changes in Price 23
  3. Cost/Price Relationship 24
Contract Term 24
Price Schedule 25
DSM Issues 27
  1. Eligible Measures 27
  2. Minimum Block 27
  3. Ceiling Prices 28
  4. Number of Winning Bidders 32
  5. Bidder Status 34
  6. Deadlines for Performance 35
EVALUATION 35
Price 35
  1. Weight 35
  2. Schedule 37
  3. Risk 38
  4. Dispatchable Projects 39
Block Size 40

TABLE OF CONTENTS

Page

Qualifying Facilities 40

Fuel Stability 41

Dispatchability 41

Site Control 42

Sponsor Experience 43

Contract Term 44

Environmental Considerations 45

Economic Development 49

All-or-Nothing Scoring 50

1. Introduction 50

2. Nature of Deposits 51

3. Permits 52

4. Financing 52

5. Engineering Design 53

6. Project Schedule and Milestones 54

Overlapping Proposals 55

Judgmental Factors 55

CONTRACT FORMATION 56

Non-Bidding Projects 56

1. Small Facilities 56

TABLE OF CONTENTS

Page

2. Resource Recovery Facilities 57

Availability 58

Schedules and Deadlines 59

Acceptance of Bids and Awards 60

Rate Recovery 60

1. Commission Approval 60

2. New Jersey Board of Public Utilities Approval 62

Force Majeure 63

Suspension of Purchase Obligation 64

Right of First Refusal 65

Liquidated Damages 66

Indemnification 67

Termination 67

General Applicability of Proposed Contract Provisions 68

ORDER 69

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

COMMISSIONERS:

Peter Bradford, Chairman
Harold A. Jerry, Jr.
Gail Garfield Schwartz
James T. McFarland
Edward M. Kresky
Henry G. Williams

CASE 88-E-241 - Proceeding on Motion of the Commission (established in Opinion No. 88-15) as to the guidelines for bidding to meet future electric capacity needs of Orange and Rockland Utilities, Inc.

OPINION NO. 89-7

OPINION AND ORDER ESTABLISHING GUIDELINES FOR BIDDING PROGRAM

(Issued and Effective April 13, 1989)

BY THE COMMISSION:

INTRODUCTION

In Opinion No. 88-15,[1] Orange and Rockland Utilities, Inc. (Orange and Rockland or the company) was directed to file, by October 17, 1988, proposed guidelines for capacity bidding (including demand-side management, or "DSM") and draft requests for proposals that complied with the determinations set forth in that opinion. Orange and Rockland filed a supply and DSM bidding plan on October 4, 1988.

---

[1] Case 29409, Future Electricity Needs, Opinion No. 88-15 (issued June 3, 1988).

Opinion No. 88-15 invited interested parties to file comments on Orange and Rockland's proposal within 45 days after the date of service of that proposal. Comments were received from the Department of Public Service staff (staff), the New York State Energy Office (SEO), the Independent Power Producers of New York (IPPNY), Long Lake Energy Corporation (Long Lake), and Sentinel Energy Savings Corporation (SESCO).

In a subsequent Notice to the Parties (issued December 8, 1988), Orange and Rockland was permitted to respond to the other parties' comments, and to submit bidding procedures and draft requests for proposals that were revised to incorporate modifications made in response to the other parties' comments, by January 3, 1989. The other parties were permitted to reply to the company's response and revised proposal by January 17, 1989. The notice also provided for an informal meeting of the parties for the purpose of narrowing or reducing the number of contested issues.

Orange and Rockland's response, which includes concessions on certain issues, was filed on January 3, 1989, and replies were submitted by staff, Long Lake, and SESCO. The informal meeting was held on February 3, 1989.

The discussion in this Opinion of Orange and Rockland's proposal is divided into five parts:

1. Supply Block: Issues pertaining to the determination of the block of capacity put out to bid and the

measurement of the capacity and energy (or corresponding savings) that would be provided by individual bidders' proposals.

2. Avoided Costs: Issues concerning the company's estimate of its own costs of meeting its resource requirements.

3. Threshold Conditions: Issues concerning conditions set forth in the company's request for proposals (RFP) that must be met before a bidder's proposal will even be considered.

4. Evaluation: Issues concerning the factors the company proposes to take into account in scoring acceptable proposals, and the weights assigned to those factors.

5. Contract Formation: Issues concerning acceptance of the company's offer to enter into a contract and certain provisions set forth in the company's proposed standard contract.

* * *

Bidding is an important technique for choosing among potential power supply sources. There is no one "right" way to do it. Indeed, a company is likely to do a better job of running a bidding plan of its own devising rather than one imposed on it by regulation. Furthermore, we can all learn from the experience of different companies with different approaches.

If a proponent utility demonstrates the willingness and ability to conduct a capacity auction that would be fair to all participants, would not impose excessive costs on participants, and would not give rise to an unreasonable risk of unacceptable environmental impacts, we will not require changes to particular provisions without convincing evidence that the modification is highly likely to improve the result.

Further, this Opinion does not compel rote compliance if the result would obviously be uneconomic or otherwise undesirable. If, for example, the scoring system seems to be compelling an unwise result, the company should so advise us before proceeding to sign contracts.

If the bidding system is ultimately unproductive because the company has operated it in an onerous or biased way or has failed to respond reasonably to the lessons of experience, the same sanctions exist in this area as in any other area of company operations. We expect--and Orange and Rockland's conduct to date is encouraging--New York power company executives to manage this area with the responsibility, energy, and imagination that their positions and salaries justify. We should no more have to oversee minutiae of company operations in this area than in vehicle purchasing, oil buying, or labor contracting. We can provide policy guidance, dispute resolution, and ratesetting, but we cannot run day-to-day operations, approve blank checks, or hold participants' hands.

With this general framework in mind, we now examine Orange and Rockland's proposed bidding plan and analyze the comments received on that plan.

SUPPLY BLOCK

Amount Put Out to Bid

1. Capacity Excluded From Supply Block

Orange and Rockland's resource plan is the schedule of capacity and energy resources to which non-utility bidders would propose alternatives. Included in that resource plan is a new 135 MW gas-fired capacity addition to create a 175 MW combined-cycle power plant at its Lovett plant site. The company initially stated that it would put out to bid only 100 MW of capacity. The company's position now is that it will accept up to 150 MW.

The company's resource plan also includes purchased power. Included in the purchased power block is electricity purchased by the New York Power Authority (NYPA) from Hydro-Quebec that would be resold to downstate utilities, including Orange and Rockland.

IPPNY questions the inclusion, in the pool of "available" future resources, power purchases for which contracts have not yet been signed. IPPNY argues that bidding should be truly "all source" in nature, and that sources of power that are not yet committed should not be exempted from having to bid.

In fact, purchases under the NYPA/Hydro-Quebec agreement can be evaluated against the results of the bidding process. Deliveries under that agreement will not begin until the mid-1990s, and the agreement may be cancelled as late as 1991. In the meantime, at least one round of bidding will have been concluded for each of the utilities. Thus, it will be possible for the utilities to evaluate the reasonableness of decisions to take power under the agreement in light of bids received.

2. Life Extension Projects

In Opinion No. 88-15, we observed as follows:

> The principal obstacle to incorporating life extension projects in an auction process is that life extension work often does not take the form of a single, clearly identifiable plant rehabilitation project. Nonetheless, life extension projects requiring significant capital investment should compete with third party purchases and with DSM proposals.[1]

---

[1] Case 29409, supra, Opinion No. 88-15, mimeo p. 22.

The utilities were directed to include in their proposed guidelines for capacity bidding definitions of "significant capital investment."

Orange and Rockland's proposal did not include such a definition, a fact staff pointed out in its comments. The company responded by proposing, as a benchmark, the cost of constructing and installing a combustion turbine. Any life extension project costing more would be considered to involve significant capital investment.

Staff and SESCO oppose the company's proposed standard. Staff argues that it needs to be refined to take life cycle costs into account, pointing out that $300/kW spent for a new turbine with a service life of 35 years is quite different from $300/kW spent to extend an existing plant's service life by 15 years. SESCO argues that the standard implies a threshold dollar amount that is too high, contending that many bids would be lower in amount. SESCO supports the same benchmark as was adopted in Massachusetts, $250/kW.

As staff suggests, the capital cost of a combustion turbine should be spread over the expected service life of the turbine. Resolution of this issue is not critical to the establishment of bidding program guidelines for Orange and Rockland, because the company's currently proposed alternative to independently-supplied capacity would be a baseload plant. The company is directed to develop a more refined estimate of "significant capital investment" consistent with staff's view and include it in any further RFP in which life extension is proposed as an alternative to independently-supplied capacity.

Bids

1. Capacity Rating

Long Lake argues that Orange and Rockland's RFP needs to be clarified to provide that the capacity rating assigned to a bid should be controlled by the results of the bidder's project's last dependable maximum net capability (DMNC) test. Orange and Rockland does not oppose Long Lake's suggestion, and its RFP should be so modified.

2. Measurement of DSM Bids

Orange and Rockland's RFP provides that the power supply equivalence of DSM projects should be measured in terms of peak demand (kW) reduction.[1] Staff and SESCO have raised somewhat similar objections to this specification.

Staff argues that DSM proposals "should specify the methodology that will be used to measure expected energy savings."[2] Staff contends that requiring such a specification--and possibly including a related variable in the ranking criteria--would be preferable to relying solely on post-award audits and evaluations (which is what Orange and Rockland proposed).

---

[1] The ceiling prices Orange and Rockland offered to pay for DSM measures reflect, in part, both avoided capacity and energy costs. The energy savings component was determined using formulae depicting the relationship between peak demand (kW) and annual energy (kWh) consumption for each DSM measure.

[2] Staff's Comments, p. 18.

SESCO, whose general position is that supply and DSM proposals should be evaluated (to the maximum extent possible) using identical criteria, notes that Orange and Rockland would require bidders of supply projects to submit "energy bids," that is, bids of total annual kWh production, but would not require equivalent bids for DSM project sponsors. SESCO notes further that supply project bidders, but not DSM bidders, would be required to set forth the "winter capability" of their projects. SESCO argues that the same requirements should apply equally to supply and DSM project bidders.

The company has now proposed to modify its DSM bidding proposal so that more detailed explications of the measurement of year-round energy and capacity savings are required. Staff's proposal, that the DSM ranking formula should be modified to give greater weight to DSM proposals that explain how projected annual energy savings will be measured, is now moot. SESCO's position will re-emerge in later discussions in this Opinion concerning a variety of issues. For now it is sufficient to state that the company's DSM bidding proposal is reasonable. We will not impose requirements such as those advocated by SESCO.

AVOIDED COSTS

In establishing general guidelines for the formulation of bidding proposals, we directed the utilities to project their own costs of meeting future resource requirements, that is, costs that could be avoided if they purchased power (or equivalent conservation) from independent suppliers.[1] We contemplated that the utilities' costs would be derived from their respective, administratively-determined schedules of long-run avoided costs (LRACs),[2] but that was not adopted as a requirement.

Orange and Rockland chose not to rely on the administratively-determined LRAC stream. Instead, it adopted an avoided-cost schedule that contemplated the completion in 1995 of a 175 MW gas-fired combined-cycle plant at its Lovett site.

Staff and SEO have raised technical questions about the company's computation of its avoided generation capacity cost. Staff argues that the annualized carrying charges should be calculated using the method adopted in the Long-Run Avoided Costs case.[3] Orange and Rockland has agreed to this modification.

---

[1] Case 29409, supra, Opinion No. 88-15, mimeo p. 34.

[2] Id., pp. 37-39; Case 28962, et al., Long-Run Avoided Costs, Opinion No. 88-13 (issued May 10, 1988).

[3] Case 28962, supra, Opinion No. 88-13, mimeo pp. 31-33.

SEO notes that Orange and Rockland's LRAC schedule assumes that the costs of the Lovett plant would be recovered over 30 years, while the company initially stated that it would not enter into a contract with a term longer than 20 years. In order to make the utility construction alternative comparable to non-utility proposals, SEO claims, the capital recovery period should be reduced to 20 years.

Orange and Rockland has responded that "the capital cost of that plant over the first 20 years of its life should be levelized in real terms."[1] Orange and Rockland has also stated that it will consider supply bids proposing contract terms exceeding 20 years, but it will give primary emphasis to performance during the first 20 years in evaluating those bids. These are proper responses to the SEO's concerns.

SEO has also questioned the load forecast underlying Orange and Rockland's LRAC projection. According to SEO, the company's estimate of its 1988 summer peak turned out to be 100 MW below its actual peak. Were the actual peak used as the base, and the company's estimate of annual peak growth applied to that base, SEO contends, all 175 MW of Lovett's capacity would be needed before 1995. This, in turn, would accelerate the projected increase in the company's LRACs.

---

[1] Orange and Rockland's Response, p. 5.

A similar issue was raised by SEO in the Long-Run Avoided Costs case, wherein the utilities' projection of the statewide summer peak was well below the actual peak. We rejected SEO's position, concluding as follows:

> Although the actual 1987 summer peak was substantially higher than the forecast submitted in this proceeding, the weather was abnormally warm, and economic growth for the state held up fairly well through most of the year. Neither economic growth nor peak load growth, however, follow[s] a smooth pattern. Increasing the 1987 base, as SEO urges, while retaining the higher growth rate adopted by the Judge is not justified on the basis of one year's experience.[1]

We reach a similar conclusion here. A long-run trend cannot be discerned from only two years' experience. There is no evidence on this record demonstrating that the abnormal conditions in those years (when compared to other historic years) will be normal conditions in future years. The company may rely on its demand forecast to estimate avoided costs.

---

[1] Case 28962, supra, Opinion No. 88-13, mimeo p. 18.

THRESHOLD CONDITIONS

General

As the term implies, "threshold conditions" are conditions that must be met before a bid will even be considered. The parties have objected to numerous specific conditions, and several have raised general objections as well.

Perhaps the most fundamental objection is raised by SESCO, a DSM vendor opposed to Orange and Rockland's proposal to adopt separate RFPs for supply and DSM options. SESCO considers the supply-side RFP, with its longer contract terms and periodic per-kWh payments, to be clearly preferable.

The biggest obstacle to allowing DSM vendors to bid under the supply-side RFP is that conservation results in a utility's losing revenue and, thus, only the DSM RFP takes lost utility revenues (that is, revenues lost from conservation) into account in setting the maximum prices paid to winning DSM bidders (other factors are also considered). As discussed later in this Opinion, Orange and Rockland should gain experience in conducting a DSM auction with reasonable maximum prices that reflect a variety of considerations. Accordingly, we will not adopt SESCO's position in this case. However, we favor integrated supply and DSM bidding, and proposals from utilities willing to conduct such auctions are welcomed.

SEO, pointing to the extensive number of precise threshold conditions, argues that Orange and Rockland should be required to establish a "dispute resolution process,"[1] under which the company would be required to (1) inform project sponsors immediately if their bids appear not to satisfy a threshold condition, and (2) allow sponsors either to bring their bids into compliance or demonstrate that the condition has been satisfied. SEO contends that adoption of such a process would reduce the potential for errors and assure that threshold conditions are fairly and uniformly applied.

SEO's position has merit. Orange and Rockland should (1) give bidders prompt notice of failure to meet a threshold condition; (2) continue to review the substance of the allegedly non-complying bids; and (3) allow correction of the non-compliance, if doing so would not delay the bid selection process or prejudice other bidders (e.g., in instances of inadvertent omissions). The RFPs should be so amended.

SEO notes in addition that Orange and Rockland's RFPs contain provisions stating that the company may reject proposals "in whole or in part," or "waive irregularities," should the company consider doing so to be in its "best interests." SEO argues that the wording of the provision is too broad and, under the terms of the RFPs, could be invoked before the objective (ranked) criteria were considered. SEO proposes that the provision be substantially rewritten or removed. Orange and Rockland has agreed to delete the provisions.

---

[1] SEO's Comments, p. 6.

Notice of Intent

Orange and Rockland's proposed RFP requires an interested project sponsor to file a notice of intent to bid within five months after the company announces its willingness to receive bids, in order to "meet minimum eligibility." The RFP states that the purpose of the notice is "to enable [the company] to gauge the potential response to [the] RFP," and it provides that sponsors "will not be bound by any of the information contained therein."

SESCO argues that completion of a notice of intent to bid should not be a threshold requirement. Instead, it argues, the company should be permitted to impose varying entry fees that reflect the extent to which bidders assisted or hindered the company's ability to determine the response to its announcement of willingness to receive bids.

SESCO's position is rejected. The RFP provides potential sponsors a reasonable amount of time to decide whether they should submit proposals, and it clearly states that notices of intent to bid will not be binding. Given the fact that Orange and Rockland has no previous experience with capacity bidding, a requirement of prior notice such as the one at issue is reasonable.

Bound Proposals

SESCO objects to the requirement in Orange and Rockland's supply-side RFP that bidders' proposals be in the form of bound documents. Although a pattern of such requirements might be evidence of a plan to increase bidders' costs unnecessarily, we will not rule on this particular requirement because we do not intend to regulate utility operations to this level of detail. Orange and Rockland should consider again whether this provision is necessary.

Number of Proposals From One Bidder

Orange and Rockland's RFP provides that only one proposal per bidding party will be accepted for consideration.[1] Staff, IPPNY, and SESCO oppose that restriction. Staff and IPPNY argue that the limitation should be one proposal per project site, because a single party might wish to submit bids for two or more distinct projects. SESCO argues simply that there should be no limitation on the number of bids submitted by one party.

Orange and Rockland responds that it would not object to staff's and IPPNY's position, provided that the RFP is amended to require that all of a party's bids must be withdrawn if any one of them is withdrawn after being selected as a winner. The company is concerned about the possibility that a sponsor might manipulate the bidding process by submitting two differently-priced bids and withdrawing the lower-priced one after both are selected. Staff shares the company's concern and agrees with the proposed amendment.

---

[1] The DSM RFP divides Orange and Rockland's (and its New Jersey affiliate's) service territory into three regions; there, the limitation is one proposal per party per region.

A provision banning the selective withdrawal of bids is reasonable and may be adopted. But if it is, there is no apparent reason for limiting multiple bids in any manner. A sponsor could legitimately submit two different proposals for developing the same site--for example, a small project with a low cost and a larger project with a higher cost. It might be the case that the larger project's price is less than the price the utility would have to pay for an equivalent block of electricity produced by other sources (including the smaller project). Under those circumstances, a rule limiting sponsors to one bid per site might discourage submission of the higher-priced bid, to the detriment of the purchasing utility's ratepayers. The RFP should not limit bidders to one proposal per site.

Entry Fee

Orange and Rockland proposes to impose non-refundable bidding entry fees of $500 and $5,000 on DSM and supply-side bidders, respectively. According to the company, the fees are justified in part to discourage frivolous bids and in part to recoup the costs of reviewing, selecting, and securing project proposals.

SESCO opposes the distinction between the DSM and supply-side bidding entry fees (it does not state which it prefers). The entry fees are opposed outright by staff, SEO, IPPNY, and Long Lake. Among them, the parties raise the following arguments:

1. Making the fee non-refundable would be unfair, given the many threshold conditions, and the reservation of a "judgment" criterion, that could result in the instant dismissal of a project.

2. The eligibility requirements, milestone procedures, and security deposit requirements proposed by the company are sufficient to deter frivolous bids.

3. Although they are alleged to be remunerative, no cost justification for the fees has been provided.

4. Bidding costs are no different from other fuel or power procurement costs, and should be recovered in the same manner unless shown to be extraordinary.

The opponents' arguments are sound, particularly the last one cited above, which is based on our earlier decision about the recovery of the costs of responding to potential bidders' information requests.[1] Should experience prove that entry fees are justified, they will be permitted by a later decision. For now, the RFP should not impose such fees.

Security Deposit

Orange and Rockland's supply-side RFP requires that projects proposing front-loaded pricing (prices in excess of avoided costs in the early years of a contract) must agree to post a security deposit (to secure later years' deliveries) if the degree of front-loading they propose exceeds certain thresholds.

No party opposes this requirement. SESCO, however, objects to the fact that a similar requirement is missing from the DSM RFP.[2] SESCO argues that DSM pricing would be, in effect, completely front-loaded, because bidders would receive immediate payment in full, on a per-kW basis, for the measures they install. SESCO would require deposits from any DSM bidder who does not agree to take periodic per-kWh prices.

SESCO's position is rejected. DSM measures, unlike generators, usually do not have running costs, and thus are likely to continue to provide demand reductions for the term of their contracts. A legitimate distinction may be made between supply and DSM options for purposes of structuring bid prices.

---

[1] Case 29409, supra, Opinion No. 88-15(A) (issued November 2, 1988), mimeo pp. 12-13.

[2] DSM bidders, like supply option bidders, would be required to remit payments to "liquidated damages" funds to secure the timely completion of their proposed projects.

Site Control

As a threshold requirement, a project sponsor must hold a letter of intent to purchase or lease its project site before its bid will be considered. SEO, IPPNY, and Long Lake oppose this requirement, arguing that it would deter potential bidders with realistic proposals from participating in auctions. IPPNY and Long Lake note that meeting the threshold would usually require the expenditure of funds by bidders who would have no assurance they will be awarded a contract. They propose that the threshold condition be changed to one requiring proof of active negotiations to acquire or lease a specific site.

IPPNY and Long Lake's suggestion has considerable merit. The company's ranking methodology gives a three-point preference to bidders who have secured ownership or long-term leases. There is no need for an exacting threshold requirement as well. The company should, moreover, consider awarding points (fewer than three) to bidders who hold letters of intent.

Disclosure Requirements

1. Financial Information

Orange and Rockland would require prospective bidders to submit financing plans and forecasted *pro forma* income statements, balance sheets, and after-tax cash flow statements. SEO, IPPNY, and Long Lake oppose the requirement, arguing similarly that (1) prospective bidders would be discouraged from participating, especially since the disclosure would be made to a potential competitor; (2) concerns about the viability of projects can be alleviated by contractual milestones and security deposits; and (3) in any event, lending institutions conduct extensive financial analyses of proposed projects, and the company should rely on their decisions to lend, not duplicate their analyses.

The proposed disclosure requirement should not be adopted as a *threshold* requirement. The company's point-scoring system rewards prior disclosure, and IPPNY and Long Lake have acknowledged that disclosure after a bid has been accepted would be a reasonable requirement.

2. Other Proprietary Information

IPPNY contends that Orange and Rockland's RFP provides insufficient guarantees that proprietary information would not be disclosed to parties who could use that information to the detriment of project sponsors. In this vein, IPPNY notes that Orange and Rockland (or a subsidiary) could be a potential competitor of its members. IPPNY proposes that the company be required to enter into agreements guaranteeing the confidentiality of disclosed information, and that project sponsors not be required to disclose such information until after bids have been selected.

SESCO opposes a provision of the RFP that would allow project proposals to become the property of Orange and Rockland upon submission. SESCO argues that proposals should remain the property of bidders unless the proposals are accepted. SESCO echoes IPPNY's contention that the company is a potential competitor, and argues that the company should not have free access to past proposals. SESCO also opposes a provision that would permit the company "to distribute copies of sponsors' bids to consultants or other non-regulatory bodies without a need to know."[1]

The company, of course, is expected to follow reasonable business practices, including those pertaining to misappropriation, collusion, and protection of confidential information, while conducting its bidding program. If the lack of a more specific directive proves to be an impediment to a successful program, that problem can be remedied later.

---

[1] SESCO's Comments, p. 13.

Disqualification of Bids

1. Changes in Representations

Orange and Rockland's RFPs provide that a winning bid may be eliminated from consideration if its sponsor requests changes to the proposal "which [the company] deems to be manipulation of the RFP process." SESCO objects to those provisions, arguing that their inclusion "seems to mean that [company] personnel do not feel confident that [they] will develop a bid package that reflects the factors that they consider important[,] and [therefore] people will give them what they ask for, rather than what they meant to have asked for."[1]

The provisions plainly apply to attempted changes to winning bids proposed by their sponsors. They have nothing to do with uncertainty on the company's part about bid specifications. SESCO's position is rejected.

2. Changes in Price

Orange and Rockland's RFPs provide that a proposal will be disqualified if its sponsor attempts to change the price bid. Long Lake and SESCO argue that the company should also be precluded from attempting to change price bids once proposals have been accepted. Orange and Rockland has agreed to accept the objecting parties' position.

---

[1] Id., p. 6.

3. Cost/Price Relationship

Orange and Rockland's supply-side RFP provides that a proposal may be disqualified if the company determines that "the Price Bid Formula submitted by Sponsor results in a payment to Sponsor for any time period which appears to be less than the Facility's production costs during that time period." SESCO objects to that provision, pointing out that it could be invoked to disqualify back-ended, but ultimately profitable, price bids.

The provision appears reasonably related to the company's legitimate interest in assuring that it does not waste time and resources reviewing proposals whose economic viability is questionable. The company will be permitted to gain experience with bidding, to determine whether this condition unreasonably excludes worthwhile proposals.

Contract Term

Orange and Rockland's supply-side RFP contemplates that proposed contract terms will range from five to 20 years, while its DSM RFP limits contract terms to two years. Staff and SESCO object to various of these limitations.

Staff initially argued that the 20-year maximum term should be eliminated, contending that facilities such as hydroelectric plants might be able to deliver greater savings after the first 20 years of operation. Such savings, staff continued, should be taken into account in evaluating bids. Orange and Rockland now states that it will not disqualify supply bids proposing contract terms exceeding 20 years, but it will give primary emphasis to expected performance during the first 20 years in evaluating those bids.

SESCO argues that the five-year minimum term for supply options should also be eliminated, contending that shorter-term purchase agreements could conceivably benefit ratepayers. SESCO's position is rejected. Non-utility producers are free to enter into a variety of short-term sales arrangements; bidding may, and should, be limited to producers willing to make longer-term commitments of capacity and energy production.

SESCO also objected to the two-year maximum term for DSM contracts. Orange and Rockland now proposes to increase that term to five years. The five-year maximum term effectively imposes a deadline for the completion of individual projects' installations. That is a legitimate purpose, and Orange and Rockland will be permitted to gain experience with DSM bidding before we will consider directing it not to preclude contract proposals exceeding five years in length.

Price Schedule

Orange and Rockland's RFPs provide that supply bidders will receive only per-kWh payments and that DSM bidders will receive only per-kW (of peak demand reduction) payments. SESCO's opposition to the latter requirement has already been discussed.

Staff, noting the disparity, states that it is unclear how the two pricing schemes "mesh on a present value basis, if at all."[1] Staff requests that Orange and Rockland be directed to demonstrate, with examples, how supply and DSM options would be compared and integrated into a final award group. Orange and Rockland has yet to respond to staff's comment. It should do so before it actually selects its first award group.

Long Lake objects to the company's refusal to accept price schedules with per-kW charges as well as per-kWh rates. Presumably, such a schedule would be more attractive to the sponsors (and financiers) of run-of-the-river hydroelectric plants. But its attractiveness to them would stem from the fact that such pricing transfers some of the financial risk of a project from its sponsor to the purchasing utility (and its ratepayers). This approach is within Orange and Rockland's legitimate discretion. If it is administered imprudently to the disadvantage of ratepayers, remedies will be undertaken.

---

[1] Staff's Comments, p. 16.

DSM Issues

1. Eligible Measures

Orange and Rockland's RFP lists seven DSM measures[1] for which it is willing to receive bids. The measures listed are those for which the company conducted economic analyses. The RFP allows sponsors to propose additional measures, but it provides that such sponsors "are required to provide performance data in their proposals which can be used to determine the appropriate Ceiling Price in the event that the measure is accepted for implementation." SESCO objected to that provision, arguing that it would impose an onerous burden on DSM bidders.

Orange and Rockland has now abandoned varying ceiling prices in favor of an across-the-board ceiling. Thus, the need for performance data has been eliminated, and the company is now willing to pay up to the ceiling price for any qualifying DSM measure.

2. Minimum Block

Initially, Orange and Rockland would have required a proposal to promise at least 400 kW of peak demand reduction in order to be considered. Staff and SEO pointed out that such a threshold would virtually preclude DSM bids by individual customers.[1] Staff and SEO supported a 100 kW threshold. SESCO opposed any threshold.

---

[1] Efficient heat pumps, efficient air conditioning, cool storage, non-electric air conditioning, efficiency lighting (ballasts and fixtures), efficient motors, and efficient fluorescent replacements.

Orange and Rockland has now lowered the minimum block to 100 kW, so it, staff, and SEO are now in agreement. The company will be permitted to gain experience with this threshold in place.

3. Ceiling Prices

As noted, Orange and Rockland initially proposed varying ceiling prices for the seven DSM measures listed in its RFP. It now states that it is willing to adopt a uniform ceiling price of $400/kW.

Staff, SEO, and SESCO all point out that this ceiling is far below the amount of costs that would be avoided by the installation of DSM measures. For example, staff explains, efficient lighting would enable the company to save $3,147/kW in energy and capacity costs measured over 15 years, while other DSM measures would tend to save considerably less to the extent that (like air conditioning) they do not operate for most of the year. The disparity between the ceiling price and avoided costs stems from the fact that Orange and Rockland would subtract revenues lost due to conservation from avoided costs before setting a price. In fact, lost revenues would exceed avoided costs for each of the seven studied measures; the only reason the company came up with positive prices is that it added "bonuses" for environmental quality and marketing incentives.

---

[1] The demands of individual customers could be grouped to meet the threshold.

Staff, SEO, and SESCO all oppose any such revenue offset. The parties note that the electric utilities have been directed to develop ratemaking innovations that would eliminate the disincentives to economic conservation programs that exist in conventional ratemaking.[1] They argue that the lost revenue problem should be settled pursuant to that decision and that bidding should be directly tied to avoided costs.

DSM programs result in lower bills for customers who install or sponsor such measures; in effect, they will receive economic benefits equal to avoided retail payments, even without any direct payment from the company for saved kilowatts or kilowatthours. Despite this benefit, however, there is a substantial degree of underinvestment in DSM measures (whether weighed against their benefit to all customers in terms of reduced total revenues spent on electricity or against environmental and other costs not reflected in electric rates), and some further incentive--such as payments by utilities--would be justified to obtain those benefits.

---

[1] Case 29409, supra, Opinion No. 88-20 (issued July 26, 1988), mimeo p. 40.

Staff, SEO, and SESCO would have Orange and Rockland set a ceiling price for demand-side measures equal to its avoided costs of supply, thereby ignoring the economic incentive that avoided retail payments provide for demand reductions. Under such an approach, a DSM bid of 3¢ per kWh would be compared, directly, to a supply-side bid of, say, 7¢, and the DSM bid would win (all else equal). But if the retail rate is 9¢, a customer could profitably install DSM measures costing up to 12¢ (9¢ bill saving plus 3¢ payment), that is, whose costs exceed the utility's avoided cost.

The problem is to give recognition to the advantages of demand-side management, some of which are difficult to quantify, without creating an excessive incentive to invest in uneconomic measures. Stated another way, there is a need to develop bidding programs for DSM measures that properly account for bill savings participants will achieve through conservation while assuring that the prices paid for DSM measures reflect the relative benefits of using such measures to displace or defer the development of supply options.

Rigorous estimates of the value of avoiding combustion emissions and reducing a utility's exposure to potential fuel price spikes, to name two benefits of DSM, are not available. Nevertheless, in the early rounds of bidding, the price schedules should be designed to recognize the benefits of DSM and encourage bids to install such measures. This is particularly true because energy service companies comprise, in many respects, an infant industry operating in an emerging product market in which customer information has not been widely disseminated. The next few years will allow a demonstration of the ability of these companies to deliver energy services in a cost-effective, competitive manner.

Orange and Rockland's ceiling price should reflect a balancing of several factors, including the following:

1. Benefits and costs to consumers.
2. Benefits and costs to the company.
3. The value of avoided emissions, reduced exposure to the risk of fuel price changes, and other benefits of DSM that cannot be directly reflected in prices and costs.
4. The price necessary to elicit bids proposing effective DSM measures.

A ceiling price of $550 per kW for DSM measures with an expected ten-year life would fairly reflect the foregoing factors. The company should propose a somewhat higher ceiling price for measures that have a significantly longer expected life.[1]

---

[1] It bears repeating that other approaches may be adopted by other companies. The foregoing conclusion applies to the proposal before us.

There is one additional issue concerning ceiling prices. Orange and Rockland's RFP requires that sponsors who wish to bid a percentage of the ceiling price for one DSM measure must bid the same percentage for all measures. SESCO objects to that requirement, arguing that a bidder who believes it can provide one measure profitably at a deep discount should not be required to bid the same discount on all measures.

The company's requirement was proposed along with a schedule of ceiling prices that varied from measure to measure. Its purpose was to encourage bidders to propose a variety of measures. The price schedule the company will set forth in its first RFP will vary only according to service lives. The company, therefore, might wish to consider an alternative approach to encourage the proposal of a variety of measures.

4. Number of Winning Bidders

Under Orange and Rockland's original proposal, its service territory (and that of its New Jersey affiliate) would be divided into three franchise areas, and only one DSM vendor (that is, a sponsor who is not a customer) per area would be awarded a contract. The company would now award three contracts to vendors in each area. The RFP does not limit the number of customer bids that would be accepted.

Staff, SEO, and SESCO have all expressed reservations about the concept of awarding franchises to DSM vendors. SESCO questions the need for franchising, pointing out that other utilities have successfully hosted DSM bidding without imposing such restrictions. Should franchising be approved, SESCO continues, the franchises should be awarded for product markets (customer types), not for geographical markets.

Staff shares SESCO's misgivings about franchising, arguing that it might favor bidders of low-cost projects with short payback periods, to the detriment of sponsors of higher-cost projects that provide greater benefits over the long run. Staff is also concerned that winning vendors could become entrenched, because they would have access to customer information that would be unavailable to potential future bidders. Staff states that it would prefer that DSM bids be received on a project-by-project basis.

Staff's opposition to franchising has softened since the company revised the franchise proposal. Staff now states that Orange and Rockland should be permitted to gain experience with franchised awards.

SEO does not oppose the requirement, but it argues that winning bidders should be required to assume a service obligation, under which they would be expected to promote other, utility-sponsored DSM programs. SEO also recommends that individual customer bidders whose proposals are rejected--presumably, because they have been beaten by DSM vendors' proposals to provide similar measures--should be given the opportunity to carry out their bids and receive the winning price.

Orange and Rockland will be permitted to gain experience with its latest franchise proposal, namely, three non-customer vendors per territory. The company's principal concern is that vendors might submit overlapping proposals, that is, different proposals that count the same customers' conservation, and that securing performance from an unlimited award group might be difficult. Experience will show whether this concern is well-founded or properly remedied by franchising.

SEO's interest in having winning vendor bidders offer a variety of DSM measures can be addressed in a number of ways, depending upon the design of the overall DSM bidding program implemented by the company. Again, the company will be allowed to devise a method (or methods) to encourage bidders to propose a broad range of measures. (And, of course, the company will continue its own DSM program.)

SEO's other proposal, that losing customer bidders be given the opportunity to carry out their bids and receive the winning price(s), is reasonable and will be adopted. In either case, vendor performance or customer performance, the same conservation would be obtained at the same price.

5. Bidder Status

Orange and Rockland's notice of intent to bid form requires a bidder to identify itself as a customer, an "energy service company," or an "other third party sponsor." SESCO complains that the company has explained neither the distinction between the second and third labels nor its importance.

No action on our part is necessary. The RFP includes the name, address, and telephone number of an Orange and Rockland employee to whom inquiries may be addressed. SESCO's uncertainties should be brought to that individual's attention.

6. Deadlines for Performance

Orange and Rockland's DSM RFP would have imposed a deadline for performance of January 1, 1992, while the deadline for supply-side sponsors is January 1, 1995. SESCO complained about the disparity. Orange and Rockland's position now is that each winning DSM bidder may implement bids through 1995.

EVALUATION

Price

1. Weight

Under Orange and Rockland's revised RFPs, up to 47 points (out of 100 possible) would be awarded on the basis of a proposal's price bid. A price bid equal to 25% of the company's avoided costs (or lower) would earn 47 points, while a bid equal to 98.7% of avoided costs would earn none. Between these two extremes, one scoring point would be taken away for each one and one-half percentage point increase in price.

In the company's initial RFP, up to 50 points could have been awarded on the basis of the price bid. Staff has pointed out, however, that the number of points actually available to proposals whose price bids lie within the likely range would not be great. According to staff, price was given insufficient weight in three proposals recently considered by the company:

Project Total Points	Price Points	Price Percentage
38	7	18.4%
42	5	11.9%
22	1	4.5%

Staff's position is that price should be given greater weight.

Orange and Rockland points out in response that many of the total points earned by projects will be won on an all-or-nothing basis, to distinguish viable from "speculative" proposals. Between two projects that earn all such points, the price bid points will be a very significant factor affecting selection. Moreover, the company adds, the stipulation with the New Jersey Board of Public Utilities[1]

---

[1] Opinion No. 88-15 was issued on June 3, 1988. Subsequently, on July 1, 1988, Orange and Rockland's New Jersey affiliate, Rockland Electric Company, entered into a stipulation with the Board's staff establishing bidding procedures. The stipulation was approved on August 24, 1988. On several issues, Orange and Rockland has argued that the decision in this case should be governed by that stipulation, even if doing so would necessitate deviating from the guidelines set forth in Opinion No. 88-15.

(hereinafter referred to as the "New Jersey stipulation") limits the weight given price to 50%.

The scoring approach proposed by Orange and Rockland is not unreasonable, and projects that are comparable in terms of stage of completion cannot avoid direct price competition (or, perhaps, using desirable "externalities" to compete against bargain prices). Orange and Rockland will be permitted to test the adequacy of its price scoring approach.

2. Schedule

Orange and Rockland's initial proposal would not have differentiated bids whose price schedules are front-loaded and bids whose price schedules either are level over time or have an upward trend. Staff proposed that a factor be developed to disfavor bids with front-loaded price schedules, which would include the traditional ratemaking ("rate base") cost recovery pattern that the company might seek for Lovett.

Orange and Rockland revised its proposal by reducing the weight given to bid prices themselves from 50 points to 47 points and assigning 3.0 points to price schedules. Under the revised approach, annual payment streams would be compared to avoided costs, and the year in which the present value of total payments would equal the present value of total avoided costs (the "breakeven year") would be determined. The number of years remaining on the contract after the breakeven year would then be divided by the contract term, and the resulting ratio would be multiplied by 3.0 to derive the points awarded for price schedule. A sponsor who agreed to payments with a pattern matching avoided costs would be awarded all 3.0 points; a sponsor proposing the equivalent of the traditional "rate base" recovery pattern would receive fewer or none.

Staff has agreed to this proposal and no other party has opposed it. Again, this is an area--one of many--in which the company will be permitted to gain experience to determine whether it has adopted proper weights for particular variables.

3. Risk

Orange and Rockland would award 0.5 points to fixed-price bids, that is, price bids that are not subject to adjustment from year to year on the basis of changes in one or more indices of price escalation. Indexed (variable) price schedules would receive no award. Staff argues that the company's estimate of the Lovett project's costs is inherently risky to ratepayers, because cost overruns not attributable to imprudence would escalate the company's ultimate price "bid." Staff would "award" a score of -5 points to bids with a "rate base" recovery pattern to reflect their particular kind of price risk. Long Lake and IPPNY argue for an even greater negative score.

We will not decide this issue at this time. The risk imposed on ratepayers by utility construction will vary by type of plant and proposed rate treatment. Should the company conclude, after reviewing the bids, that its customers would be better served by utility construction, it should propose that course to us before proceeding.

4. Dispatchable Projects

Staff points out that under Orange and Rockland's RFP a dispatchable project whose off-peak price bid exceeds avoided costs could be given an improperly low price score. This could happen, staff explains, because the company would calculate a weighted average price bid for such a project using all rates and all hours of availability, even though it would likely turn off the project during off-peak hours. Accordingly, staff recommends that the calculation of the weighted average price should assume that the off-peak price will be charged only during the minimum number of non-dispatchable off-peak hours.

Orange and Rockland has not responded to staff's comments. The method of calculating a bidder's weighted average price--and the company's total payments--proposed by staff is adopted.

Block Size

Under Orange and Rockland's DSM RFP, 3.0 points would be awarded to bids that meet or exceed the following block sizes:

	Block
Third Parties/Region:	
Rockland	4,600 kW
Orange/Sullivan	2,300 kW
Customers	400 kW

SESCO, who, as noted, is a DSM vendor that wants to bid under the company's supply-side RFP, objects to the DSM block size bonus on the grounds that no comparable bonus would be given to promoters of supply options.

SESCO's position is rejected. The block size bonus reflects a reasonable preference for ambitious DSM proposals, a preference that is consistent with state policy.

Qualifying Facilities

Orange and Rockland proposes that one point be awarded to proposed projects that have been certified as "qualifying facilities" (QFs) by the Federal Energy Regulatory Commission (FERC). Staff questioned the propriety of distinguishing QFs from other producers. Orange and Rockland responded that the federal Public Utility Regulatory Policies Act (PURPA) and FERC's regulations under PURPA specifically state that QF generators are especially beneficial to society, and that such benefits should be encouraged.

Orange and Rockland's proposal is adopted. QFs must meet fuel use efficiency standards, and they enjoy exemptions from the Federal Power Act and the Public Utility Holding Company Act, exemptions that could facilitate contract formation. If other third-party facilities achieve similar status in the future, Orange and Rockland should respond accordingly.

Fuel Stability

Orange and Rockland proposes to award supply proposals 2.0 points if their sponsors have secured contracts for fuel supply and transportation lasting the duration of the proposed power supply contract. DSM proposals would automatically be awarded 2.0 points. SESCO objects to the automatic award for DSM proposals. According to SESCO, if the host or sponsor of a DSM project completely shuts down operations, the DSM would lose its "fuel," and would thus lack stability.

DSM and supply options are, in a number of respects, equivalent, but SESCO's analogy here is unconvincing. Orange and Rockland's proposal is reasonable.

Dispatchability

Orange and Rockland's original proposal was to award 4.0 points to projects whose sponsors agreed in advance to accept 4,000 or more hours of dispatchability and 300 or more interruptions per year, and no points for any lesser commitment. The company and staff now agree that 2.0 points should be awarded to sponsors agreeing to 2,000 to 3,999 hours of dispatchability and 150 to 299 interruptions. This agreement is reasonable, and both the supply-side and DSM RFPs should be modified to reflect it.

SESCO points out the wording of the DSM RFP--which is simply copied from the supply-side RFP--suggests that DSM projects could be "dispatched" by turning off conservation measures. The company should clarify the dispatchability provisions in the DSM RFP.

Site Control

SESCO notes that 3.0 points would be awarded to supply-side bidders who either own their sites or hold long-term leases, but would be awarded only to DSM bidders who own their facilities. SESCO argues that the site control provisions in the supply-side and DSM RFPs should be identical.

A distinction between the RFPs is warranted. Supply projects would usually entail site development, or the refurbishment of structures and fixtures that have been leased for that purpose. DSM measures, on the other hand, might entail alterations of structures and fixtures that tenants might not be entitled to undertake. The DSM RFP need not be changed.

Sponsor Experience

Orange and Rockland proposes to award points to both supply and DSM projects whose sponsors' project development teams have at least one member who has previously developed a project similar to their proposed projects. Supply-side projects would be awarded 2.0 points, while DSM projects would be awarded 4.0 points.

Staff argues that the DSM award should be greater than 4.0 points, because experience and work plan quality are usually considered very important by project hosts. SESCO argues that the points at stake should be the same for both supply-side and DSM project bidders (but does not state which amount should be offered).

Orange and Rockland initially stated in response that it would attempt to develop additional objective standards to evaluate bidder and work plan quality. But its position now is that no greater weight should be given to DSM sponsors' experience and quality, because there is no certainty that a project bid will actually be developed.

The company's proposals are adopted. The greater weight given to DSM bidders' experience would reflect its importance to project acceptance; and given the number of all-or-nothing variables in the DSM RFP (including this one), 4.0 points could have a significant effect on auction outcomes. The company should, however, consider both experience and work plan quality in determining whether a proposal is eligible to receive those points.

The 2.0 point weight for supply-side bidders' previous experience is not unreasonable, because the other two points would be assigned to variables reflecting the status and viability of the supply options under consideration. In other words, a supply project with a first-time sponsor whose preliminary planning and development are proceeding successfully would not have a significant disadvantage vis-a-vis a similarly situated project with an experienced sponsor.

Contract Term

Orange and Rockland's proposed supply-side RFP would encourage long-term contracts to deliver power. Contracts of 10 to 14 years would be awarded 2.5 points, and contracts for 15 years or longer would be awarded 5.0 points.

The DSM RFP does not have an equivalent provision. The company now proposes maximum contract terms of five years, and points would be awarded only for long-term maintenance contracts (or maintenance proposals by customer bidders). A maintenance arrangement of five to 10 years would be awarded 3.0 points, while an arrangement lasting for more than 10 years would be awarded 6.0 points.

SESCO objects to the disparity between the supply-side and DSM RFPs. As discussed earlier, SESCO's position is that DSM vendors should be awarded long-term payment agreements (with per-kWh payments) that are analogous to power sales contracts, something which Orange and Rockland will not be required to do. The company's proposals are reasonably related to the natures of the underlying technologies, and they are adopted.

Environmental Considerations

Orange and Rockland initially proposed to distinguish the environmental impacts of supply projects solely on the basis of fuel type, and assign a maximum weight of 7.0 points. DSM projects would automatically be given the maximum score. In response to staff's criticisms, the company submitted, with its draft environmental impact statement, a more expansive analysis that takes into account not only emissions, but also factors such as water consumption, liquid and solid waste, and land use impacts. The company would also increase the maximum weight to 10.0 points. The company disagrees with SEO's position that the minimum environmental weight should be between 20 and 30 points.

The parties agree--or, at least, none explicitly disagree--with two fundamental considerations. First, although all projects proposed by bidders must meet environmental standards and must ultimately be evaluated and permitted to operate by appropriate regulatory agencies, meeting the threshold requirements will not make all projects environmentally equal. Because projects that are environmentally inferior (although approvable) might benefit from higher scores on their price bids, a fair bidding process should allow projects to receive higher scores based on environmental superiority. In many cases, the construction and operation of an environmentally inferior energy source consume more public resources such as clean air and water. These are environmental externalities, and, if money is spent to mitigate those externalities or to compensate the affected public, the price advantage for an environmentally inferior source would be removed, and a higher-cost project that is more environmentally benign would be competitive. Including environmental externalities in the bid ranking process recognizes that environmental impacts have economic value and that a project that reduces or avoids the level of pollution should be awarded a score that neutralizes the price advantage of a project that is less environmentally benign. Recognition of environmental externalities in this fashion would increase efficiency in the allocation of resources and would anticipate the almost inevitable increasing cost of adverse environmental impacts in the future.

Second, the parties addressing themselves to the issue now agree that different weights should be assigned to different kinds of externalities, such as air emissions, water consumption and discharges, and land use.

There remain two issues: (1) the parties have yet to devise a ranking of the relative importance of the different externalities; and (2) the parties disagree about the points that should be given to the overall environmental factor, relative to other factors. We have concluded, on the basis of our review of the company's draft generic environmental impact statement (DGEIS) under the State Environmental Quality Review Act (SEQRA), that both issues should be resolved by taking into account estimates of the costs of mitigating the different externalities (1) relative to one another and (2) in toto, relative to avoided production costs.

In its response to SEO's comments on the company's DGEIS, staff agrees with the company's basic approach to determining the weights of the externalities relative to one another (that is, within a separate environmental scoring system): the company would assign points, totaling 60, to the various externalities. Staff does not, however, agree with the company's distribution of points among the externalities.

In its response, staff has provided estimates--concededly, judgmental ones--of the costs per kWh of mitigating various externalities. Staff would reassign the 60 points to the externalities roughly in proportion to their relative costs, as follows:

Externality	Mitigation Cost (¢/kWh)	Points
Air Emissions		
Sulfur Oxides	.250	10
Nitrogen Oxides	.550	23
Carbon Dioxide	.100	4
Particulates	.005	1
Water Impacts	.100	4
Land Use	.400	18

Staff would have the company subdivide the water impacts and land use categories. The former would reflect cooling water, water consumption, and liquid waste, while the latter would reflect terrestrial impacts, fuel delivery, noise, transmission, solid waste, and aesthetics.

Staff's approach will be adopted for this case. While a consistent evaluation method, which SEO urges be adopted in this case, would be desirable, the environmental scoring methods reflect an evolution in the thinking of the utilities and staff. This will make it difficult to develop only one methodology in the first round of bidding. Most of the utilities have developed acceptable, albeit imperfect and not totally consistent, methodologies. In the experimental spirit of this first round of bidding, we will independently review methodologies proposed by the other utilities, and may consider modifications to methodologies based on (1) the parties' comments throughout the review process, and (2) the review of comments on each utility's DGEIS, to assure that each provides a reasonable basis for scoring environmental externalities. What is lost for lack of consistency in the first round of bidding will be gained in experience with the different approaches.

The other issue concerns the weight that should be given the environmental factor vis-a-vis other variables. This issue, too, should be resolved on the basis of estimated costs, specifically, by comparing the costs of mitigating externalities to production costs. As noted, staff's estimate of the former cost is 1.405¢/kWh. Orange and Rockland's levelized avoided cost for the 15-year period from 1989 through 2003 is estimated to be 6.42¢/kWh.[1] Assuming that the average winning bid price is equal to 90% of avoided costs, or 5.778¢/kWh, the costs of mitigating externalities would be approximately 24% of production costs. Orange and Rockland would award 15 points to a price bid that is 24% lower than its own avoided costs. To put environmental considerations on a comparable footing, therefore, the environmental factor should also be worth 15 points, relative to the price factors and other non-price factors. Orange and Rockland is directed to increase the environmental weight to that level.

Economic Development

SEO argues that Orange and Rockland's supply-side RFP should include "economic development criteria . . . as an externality against which alternative supply options should be evaluated."[1] SEO continues:

---

[1] Case 28962, et al., supra, Opinion No. 88-13, Appendix B, Table 6.

> From a broad policy perspective, a project that enables a New York business to retain or expand its operations within the state as a result of the application of the thermal byproduct, for instance, is of greater value than an otherwise similar, self-standing project.[2]

The "economic development" potential of a proposed project is even harder to evaluate than its environmental impact. It is an appropriate topic for management judgment rather than a fixed point allocation. Other utilities have included economic development variables in their scoring systems; but we shall not order Orange and Rockland to change its proposal because it lacks one.

All-Or-Nothing Scoring

1. Introduction

Many of the factors taken into account in evaluating both supply-side and DSM proposals have been assigned points that would be awarded on an all-or-nothing basis. Orange and Rockland has specified the criteria that must be met before all points assigned to those factors would be awarded; if fewer than all of the criteria underlying a factor are satisfied, no points would be awarded.

---

[1] SEO's Comments, p. 14.

[2] Id.

As discussed earlier, the company has agreed to modify the dispatchability factor to award points to an intermediate level of performance in response to staff's objections. Parties have criticized the scoring of other variables.

2. Nature of Deposits

Orange and Rockland would require winning bidders whose projects have not been completed to make deposits to "liquidated damages" funds that would be forfeited if the projects are not completed on time. The company would also require winning bidders who propose sharply front-loaded price schedules to post security deposits calculated on the basis of the extent to which payments would exceed avoided costs. The company would award a total of 2.5 points if such deposits either are not required or are provided in cash.

SEO opposes the award of points to facilities that put up cash. In SEO's view, the payment itself should be considered sufficient to offset any increased risks to ratepayers, and the nature of the payments should not be taken into account to favor certain bidders.

This is a legitimate area of management judgment, to be modified as experience dictates.

3. Permits

Orange and Rockland would award 2.0 points to bidders whose projects have obtained all federal and state "licenses, approvals, and permits," and local zoning and planning board approvals. Bidders whose projects have obtained some but not all permits would be awarded no points. IPPNY objects to that proposal, arguing that there should be an intermediate award--presumably, one point--to bidders who have received some permits.

Orange and Rockland's justification for all-or-nothing scoring for this factor is that some permits are relatively easy to obtain, while as few as one or two approvals might prove to be troublesome (particularly, the company contends, at the local governmental level). In the company's view, projects that have cleared the permitting process should be given a distinct advantage. This view is also a legitimate exercise of management judgment.

4. Financing

Orange and Rockland proposes to award 2.0 points to bidders of supply projects who provide written guarantees of the "availability of at least 50% of required financing" and documentation showing that their average interest coverage ratios for the duration of their contracts will be at least 1.5x.

Staff argues that the coverage requirement should be reduced to 1.2x, while Long Lake claims that the term "availability" is unclear in meaning. Long Lake also contends that no financial institution would guarantee financing without knowing final prices and contract terms.

Orange and Rockland's proposal represents legitimate management judgment. The coverage ratio supported by staff--1.2x--is more a minimum acceptable standard than a target that should be rewarded. Similarly, not every project will be able to guarantee financing, but some--such as projects sponsored by joint ventures or industrial hosts--will.

The DSM RFP includes a similar factor, but 4.0 points would be awarded, and the coverage target is replaced with a requirement that the bidder either be a customer or have entered into a shared savings arrangement. SESCO argues that the financing factors should be the same in the supply-side and DSM RFPs. (SESCO does not state which it prefers.) Again, however, it is not unreasonable to give a preference to better-financed proposals. Given the number of factors for which DSM proposals would be automatically awarded points, the higher award for financing in the DSM RFP may help to distinguish the stronger proposals.

5. Engineering Design

SESCO objects to the fact that the supply-side RFP, but not the DSM RFP, would recognize and award points for the completeness of projects' engineering designs. But as discussed earlier, the DSM RFP compensates for this difference by giving greater weight to a related factor, sponsors' experience. The RFPs need not be identical.

6. Project Schedule and Milestones

Orange and Rockland proposes to award 2.0 points to supply-side projects whose construction is complete at the time of bidding and no points for any lesser stage of development. IPPNY urges that an intermediate award target be established.

The company will be permitted to gain experience with bidding with this factor in the RFP. The sponsor of a project that is constructed by the time bidding begins will have assumed a considerable risk, and a 2.0 point advantage would be a modest reward.

Orange and Rockland's DSM RFP initially required project completion within two years and would have awarded 2.0 points for proposals that would be completed within 18 months. Now, the company would allow a five-year period for project completion. It has not indicated whether it would correspondingly change the criterion for the 2.0 point award. It should do so when it submits its compliance filing.

SESCO appears to believe the schedule and milestones factor would be inapplicable to a proposal to perform work at multiple sites. The wording of the text of the RFP is not as clear as it could be, but the draft schedule format itself clearly does contemplate multi-site projects; the deadline would be for the achievement of a demand reduction goal.

Overlapping Proposals

Staff states that Orange and Rockland should adopt procedures for assuring that the DSM proposals it accepts do not overlap, that is, do not rely on the same customers' conservation. As discussed earlier, the company will accomplish this by limiting the number of awards to DSM vendor bidders. The company should also be alert for incompatibilities between or among supply proposals in its award group.

Judgmental Factors

In Case 29409, utilities were directed to make their bid ranking criteria as objective (quantitative) as possible, but it was recognized that less-measurable criteria would prove necessary or desirable.[1] In its DSM RFP, Orange and Rockland states that it will take into consideration factors such as sponsors' marketing plans, financial services, financial viability, technical competence in installing measures and determining peak demand reductions, overall experience, and "any other pertinent criteria as evidenced by Sponsors' submitted proposals." In both the supply-side and DSM RFPs, the company reserves the right "to employ additional optimization techniques" that "complement" the ranking formula.

---

[1] Case 29409, supra, Opinion No. 88-15, mimeo pp. 17-18.

Staff and SEO argue that those provisions are not sufficiently clear. Both note that the term "additional optimization techniques" is not explained, and SEO adds that the company has given no indication of what it would consider to be "best" or "worst" when examining the factors spelled out in the DSM RFP.

SESCO argues that any rejection solely on judgmental grounds should be subject to our review. And, more generally, it questions the need for any judgmental review, given the requirement that many winning bidders post security deposits.

The company should explain how it would use or has used judgmental criteria to select an award group, namely, whether to select an award group that matches the capacity block put out to bid using both points and judgment, or, instead, to narrow down a larger preliminary award group that is to be selected solely on the basis of points.

CONTRACT FORMATION

Non-Bidding Projects

1. Small Facilities

In Case 29409, small production facilities were exempted from having to bid, and "small" was defined as two or fewer megawatts. Such facilities would be paid a price equal to the average price paid to winning bidders.

The New Jersey stipulation defines "small" as five or fewer megawatts, and it provides that the price paid to them be set equal to full avoided costs. Staff and Orange and Rockland have agreed that, for the first auction, the company should follow the stipulation. Staff states that it will reexamine this issue before the company's second RFP is issued. Staff has also requested the company to explain how it will limit the amount of non-bid purchases to 25 MW, as it states that it intends to do. The company should provide that explanation.

SESCO argues that DSM proposals that account for fewer than five megawatts of capacity savings should also be permitted to enter into non-bid contracts. Orange and Rockland opposes SESCO's position, arguing that its adoption would effectively end DSM bidding before it began and would, in any event, run afoul of the New Jersey stipulation. Orange and Rockland will be permitted to gain experience with DSM bidding in the manner proposed.

2. Resource Recovery Facilities

The New Jersey stipulation provides that, for three years following its adoption, Orange and Rockland must offer contracts with prices set at full avoided costs to "qualified" New Jersey waste incineration/power plants. One requirement for "qualification" is that a plant must be included in the solid waste management plan of one of three specified New Jersey counties. This set-aside is reflected in Orange and Rockland's draft contract.

Set-asides are a form of subsidy. To the extent that they produce higher costs, they raise customer rates. They also distort the economics of incineration compared to recycling and other forms of trash disposal. States may have valid public policy reasons for choosing to pay such subsidies, but this Commission cannot endorse them as sound power supply policy. The provision should be deleted.

Availability

Orange and Rockland initially proposed to require that a plant be capable of achieving, at the will of its operator, an 80% availability factor in order to be eligible to bid. After IPPNY and Long Lake protested that such a threshold requirement would exclude run-of-the-river hydroelectric plants from bidding, Orange and Rockland dropped the threshold requirement. However, the company still plans to assume run-of-the-river plants would operate at 80% availability, for purposes of evaluation and selection, and would retain a contract provision imposing penalties for failing to meet that level.[1] IPPNY and Long Lake continue to oppose this provision on the grounds that it wrongfully discriminates against a class of QFs.

---

[1] The calculation of penalty payments is no longer a contested issue. They would be set equal to approved capacity costs that would be specified in the contract.

These are cumbersome ways of dealing with the problems of valuing competitively the energy from run-of-the-river hydro units. Reasonable adjustments to reflect the value of the energy and capacity at the time it is available are acceptable, and we look to the company to devise them.

Schedules and Deadlines

As discussed earlier, Orange and Rockland initially proposed to require winning DSM project sponsors to complete their projects within two years. (Sponsors would now be allowed five years.) The proposed draft contract contains a provision, applicable to third-party bidders (DSM vendors), in which the company reserves the right to step in after one year and contract with another third party to provide DSM services to members of a customer group not already under contract with the winning bidder.

SESCO objects to the proposed provision, primarily on the grounds that no such provision would be applicable to supply-side bidders. SESCO also contends that the provision would deter parties from bidding in DSM auctions.

The apparent purpose of the provision is to allow Orange and Rockland to assure itself that DSM proposals on which it is relying are actually carried out. This is a valid purpose, but the security deposit requirements seem sufficiently rigorous to compel DSM bidders to perform. The provision at issue should be deleted from the contract that will be offered following the first DSM auction. Should the company's experience demonstrate a need for such a provision, it could be included in subsequent RFPs.

Acceptance of Bids and Awards

SESCO objects to the fact that Orange and Rockland would allow itself three months to "attempt to determine the initial composition" of its award group, but would allow winning bidders only five days to accept the company's offer to enter into a contract. SESCO appears to argue that the company should be able to identify the award group with some certainty in a shorter period of time, and that the winning bidders should be allowed more time to consider whether to accept awards.

Orange and Rockland will be permitted to conduct its first auction along the schedule it proposes. Should experience show that a different schedule would be warranted, the company should change it.

Rate Recovery

1. Commission Approval

Orange and Rockland's proposed contract provides that "[e]ach party acknowledges that the Commission has ordered Buyer to submit this Agreement to the Commission for its review and possible modification or abrogation within sixty (60) days of submittal." The contract provides further that "[a]pproval of this Agreement by the Commission pursuant to this Article shall constitute authorization by the Commission of the full recovery of all direct purchase costs incurred by Buyer under this Agreement, and allocable to Buyer, through Buyer's fuel adjustment clause."[1]

Staff opposes the proposed provisions. It points out that contracts with non-QF sellers need not be approved by us (FERC's approval would be sufficient), and it asserts that our review of contracts with QFs is unnecessary. Staff also objects to the stipulation of recoverability, arguing that we will be approving procedures, not purchases made once those procedures are followed. At most, staff contends, purchases under approved procedures should be entitled to a presumption of reasonableness, but recoverability should be established "in a rate setting context."[2]

Staff's position is opposed by Orange and Rockland, IPPNY, and SESCO. The parties argue similarly that its adoption would encourage utilities to write "regulatory out" clauses (under which purchase agreements would be cancelled or modified, were purchase prices, respectively, disallowed or partially recognized for ratemaking purposes) into their contracts. Orange and Rockland argues further that it has been required to submit a bidding proposal that is described

---

[1] Similar provisions apply to the New Jersey Board of Public Utilities, and have been approved by the Board.

[2] Staff's Comments, p. 20.

"in the minutest detail,"[1] and, therefore, it should be entitled to a presumption of prudence, should its proposal be adopted. The company adds that the market will produce the most desirable contracts, if the bidding process is properly structured.

Following the meeting to narrow contested issues, held on February 3, 1989, Orange and Rockland stated that it would agree to accept an understanding that its bidding process would be reviewed and approved by us, and that purchases under contracts formed pursuant to that process would be presumed prudent. This is a reasonable approach. The contract provisions at issue should be deleted.

2. New Jersey Board of Public Utilities Approval

Orange and Rockland's proposed contract provides that supply-side bids submitted, accepted, and approved under its New York bidding process must also be approved by the New Jersey Board of Public Utilities before they can take effect. Long Lake and SESCO question the validity of that provision.

It is not at all clear how Orange and Rockland could enforce the provision against bidders whose projects are located in New York. Under PURPA and FERC's regulations implementing PURPA, we are given the power--and the duty--to establish the terms under which QFs sell power to the utilities subject to our jurisdiction. If the utility/QF interconnection is in New York State, the New Jersey Board of Public Utilities has no jurisdiction over it. And the acceptance of non-QF bids would be subject to FERC's approval. Accordingly, the provision should be modified to eliminate the requirement that contracts be approved by New Jersey regulators.

---

[1] Orange and Rockland's Response, p. 11.

Force Majeure

Orange and Rockland's proposed contract provides that a winning bidder may invoke *force majeure* to postpone its project's commercial operation date without incurring liability for breach of contract. The contract states, however, that *force majeure* may not be invoked once commercial operation has begun to excuse non-performance. IPPNY objects to the latter provision, arguing that *force majeure* "must always be recognized."[1]

The proposal to limit the invocation of *force majeure* to pre-operation events is reasonable as long as it applies to all projects and their evaluation equally. In particular, utilities cannot expect their own future capacity additions to be given more favorable treatment for ratemaking purposes in the event of *force majeure* non-delivery unless the evaluation process contemplated such treatment.

---

[1] IPPNY's Comments, p. 10.

The company should rewrite the force majeure clause to make its limited applicability explicit. In the draft contract, the limitation is set forth in the section about liquidated damages.

Suspension of Purchase Obligation

Orange and Rockland's proposed contract provides that the company's obligation to take and pay for winning bidders' power production will be suspended "for any periods of time during which, for reasons of repair, connection of other customers or generators of electricity, system emergency or safety, [the company's] system is physically unable to accept such [e]lectricity."

Staff objects to that provision, arguing that the same condition does not apply to Orange and Rockland's existing plants or to its planned Lovett plant. In other words, should the company decide it needs to disconnect those plants, it would continue to recover their costs in rates. Staff recommends that the company be required to develop a schedule of capacity payments that non-utility producers would receive while these plants are disconnected.

Orange and Rockland opposes staff's recommendation, arguing that non-utility plants that choose sites that are removed from the bulk of its transmission facilities should bear the risks of reduced reliability. Lovett, in contrast, is located near several different transmission links.

Staff, replying to Orange and Rockland, continues to support "take or pay" charges for non-utility producers. It also argues, apparently in the alternative, that the company's position would be sound only if it agrees to provide all the information necessary for bidders to assess the risks of disconnection at various locations.

Staff's position is rejected. FERC's regulations implementing PURPA permit the suspension of its purchase obligation during system emergencies.[1] And the contract imposes a number of best efforts and notice requirements on the company to minimize the risks and durations of disconnections. Finally, the company is already under an obligation to disclose information about its transmission system. Take or pay charges need not, and should not, be adopted.

Right of First Refusal

Orange and Rockland's proposed contract gives the company the first option, lasting 30 days, to purchase a non-utility plant that is put up for sale. The company would also be given that option at the conclusion of the first contract term, should it and the plant owner fail to negotiate an extension, but it would not apply to a sale of the plant to a successor to the plant owner's business, or to an affiliate of the owner.

---

[1] 18 C.F.R. §292.307(b).

IPPNY claims that the provision "effectively eliminates the market for the project and unfairly penalizes the developer."[1] It requests that the provision be eliminated.

The contract provides that the purchase price be set equal to fair market value, and it states that a "bona fide unrelated third party offer acceptable to Seller shall be presumptive evidence of fair market value." The provision is reasonably related to the company's obligation to provide continuous, reliable service. IPPNY's position is rejected.

Liquidated Damages

SESCO objects to the fact that forfeitures of security deposits would be in the form of liquidated damages, that is, damages that are estimated in advance of the non-performance the deposits are intended to deter. SESCO claims that actual damages might be far less, and can be calculated "using the same [New York Power Pool] tests and costs as [the company] uses for determining if there are capacity shortfall damages and the costs of those damages that cannot be mitigated."[2]

---

[1] IPPNY's Comments, p. 11.

[2] SESCO's Comments, p. 9. SESCO also contends that payments from the liquidated damages fund would not be proportionate to the extent that a project's progress falls short of the bid's proposal, but that contention is simply incorrect.

The "liquidated damages" are intended to secure project performance in a timely manner. As such, they might be more properly termed "penalties" or "forfeitures." In any event, the Power Pool does not have "tests and costs" for instances of non-performance such as failing to secure environmental permits or financing on schedule.

Indemnification

Orange and Rockland's proposed supply-side contract includes a standard indemnification clause under which both parties agree to indemnify one another and limit liability for certain acts or omissions. In the DSM contract, however, the indemnification and limitation provisions run only in the company's favor. SESCO argues that the DSM contract provisions should also be mutual. SESCO's position is sound and is adopted.

Termination

Orange and Rockland's proposed contract provides that it may be terminated if a project fails to deliver power for six consecutive months, or on a total of 120 days in a given year. IPPNY and Long Lake argue that those periods of time should not include time down for scheduled maintenance. Orange and Rockland opposes IPPNY's position.

While a termination process is reasonable, this one appears onerous and redundant with Orange and Rockland's proposed penalties for failing to meet contractual availability levels. Penalties commensurate with damages are a reasonable deterrent. Termination should follow on a demonstration of sustained and uncorrected unreliability of a greater duration.

IPPNY and Long Lake argue as well that a breach of contract should not be considered grounds for termination unless it materially affects performance under the contract. Orange and Rockland agrees with this position, and states that it will rewrite the contract accordingly.

SESCO argues that bidders should have some sort of dispute resolution mechanism--either a right to appeal or an arbitration process--in order to be protected against arbitrary decisions to terminate contracts. Such a process is not necessary, because contracts can be enforced in the courts and utilities' decisions to terminate could be reviewed for their reasonableness in ratemaking proceedings.

General Applicability of Proposed Contract Provisions

Orange and Rockland's RFP provides that the draft contract terms it submitted are subject to negotiation. The parties to this proceeding (and other parties) should understand that the acceptance of any particular provision does not mean that it has been accepted or approved as a "standard" provision. Moreover, they should understand that a particular directive or conclusion about a proposed RFP or contract provision in this case will not preclude our reaching a different decision about another utility's proposal.

The Commission orders:

1. Orange and Rockland Utilities, Inc., is directed to submit to the Secretary of the Public Service Commission, on or before thirty (30) days after the effective date of this Opinion and Order, twenty (20) copies each of a revised draft request for proposals and revised draft contract, both of which are consistent with the foregoing Opinion. The company shall not solicit bids under the revised draft request for proposals until it is approved by the Commission.

2. This proceeding is continued.

By the Commission,

JOHN J. KELLIHER
Secretary

American Council for an Energy-Efficient Economy

1001 CONNECTICUT AVE., N.W. SUITE 535 WASHINGTON, DC 20036 (202) 429-8873

ENERGY SAVINGS ESTIMATES FROM ENERGY EFFICIENCY PROVISIONS IN THE JOHNSTON-WALLOP BILL

Howard Geller, ACE^3
Steve Nadel, ACE^3
Bill Prindle, Alliance to Save Energy

February 12, 1991

Introduction

These energy savings estimates refer to the energy efficiency and vehicle fuel economy provisions in the National Energy Security Act of 1991 (S. 341) introduced by Senators Johnston and Wallop in early February. It should be realized that some of the savings estimates are very approximate due to the difficulty in projecting savings from regulatory reform, consumer education, and the like. Thus, the savings estimates are necessarily "order of magnitude".

1. Building energy efficiency standards

The proposal would increase compliance with standards that are mandatory for new federal buildings and extend the standards to homes qualifying for FHA loans. We estimate that this provision will affect about 900,000 new housing units through 2000. The estimated energy savings are 0.025 Quads in 2000 and 0.10 Quads cumulative during 1993-2000.

2. Residential home energy efficiency ratings

The legislation calls for federal guidelines for conducting home energy ratings and technical assistance to states that are interested in adopting home energy rating programs. This type of provision is likely to have limited impact. We estimate savings of 0.0005 Quads in 2000 and 0.002 Quads cumulative during 1993-2000.

3. Creation of research centers for energy-intensive industries

While we support the idea of expanded R&D and joint ventures to improve the efficiency of energy-intensive industrial processes, this initiative is not likely to result in energy savings by 2000. The initiative should have some impacts over the long run, but they are impossible to estimate.

4. Report to Congress on what it takes to reduce oil consumption and energy use by specified amounts

Preparing this type of report results in zero energy savings.

5. Voluntary guidelines for industrial auditing and industrial insulation levels

This section instructs DOE to develop voluntary guidelines for industrial audits, which when used should lead to better identification of cost-effective energy savings measures in factories. However, it could make the audits more complex and costly. Without further incentives, we assume that there is no net increase in adoption of conservation measures and no net energy savings.

This section also instructs DOE to develop voluntary guidelines for insulation levels in industrial facilities and to conduct some education and technical assistance. Authorization levels for the latter are relatively limited, however. We expect that this provision will have a small impact. We estimate energy savings of 0.03 Quads in 2000 and 0.22 Quads cumulative during 1993-2000.

6. Energy efficiency labeling for windows and window systems

Since window efficiency testing and labeling is not yet systematically occuring, this initiative should result in energy savings. We assume a moderate efficiency improvement (i.e., use of one low-emissivity coating) in 25% of the window glass produced during 1993-2000 as result of the window testing and labeling initiative. The estimated energy savings in 2000 are 0.06 Quads and the cumulative energy savings during 1993-2000 are 0.23 Quads.

7. Collect more information on energy use and efficiency improvements

While it is important for DOE to collect adequate information on energy use and efficiency trends, this initiative results in zero energy savings.

8. Energy efficiency labeling for lamps and luminaires

Since the nominal power level and light output of lamps are already widely available and used, there will be no energy savings from mandatory lamp labeling. On the other hand, the efficiency of luminaires (i.e, fluorescent light fixtures) is not readily available at present. Thus, testing and labeling the efficiency of luminaires should help purchasers who are interested in energy performance. Assuming that efficiency labeling affects 90% of new fixtures starting in 1994 and results in a 1% efficiency improvement on average, the resulting energy savings are 0.01 Quads in 2000. Cumulative savings during 1994-2000 are estimated to be 0.04 Quads.

9. Studies of the feasibility of efficiency standards on lamps, motors, and distribution transformers

This provision requires DOE to study the feasibility of setting minimum efficiency standards on these products. DOE must prepare reports and send its recommendations to the Congress. Since only studies and reports are called for, no energy savings are assumed.

10. Federal energy management provisions

The subtitle on federal energy management includes requirements for implementing conservation measures in federal buildings, creation of a modest fund for financing energy efficiency projects, and provisions to accelerate use of shared savings arrangements. The estimated energy savings are 0.01 Quads in 2000 and 0.05 Quads cumulative for 1993-2000.

11. Encouraging utility regulatory reform so that utilities have financial incentives for pursuing energy efficiency measures

This provision should lead some state utility commissions to reform their regulations sooner than they otherwise would, which will result in more aggressive utility conservation programs. It is difficult, however, to estimate what concrete actions and impacts will occur as a result of encouraging regulatory reform. Assuming that this provision leads to an expansion in utility conservation programs by $100 million/yr starting in 1994 and that this expansion grows to $1.2 billion/yr by 2000, the estimated energy savings in 2000 are 0.15 Quads. Cumulative energy savings during 1994-2000 would be around 0.41 Quads.

12. Vehicle fuel economy standards

Title XI of the Johnston-Wallop bill requires the Secretary of Transportation to conduct a rulemaking to prescribe new CAFE standards for cars and light trucks for the periods 1996-2001 and 2002 and thereafter. The legislation states that standards should be considered by size class and should be stated in terms of percentage improvement by manufacturer. It also indicates the criteria that should be used in considering the feasibility new CAFE standards.

The Secretary of Transportation is required under existing law to set tougher CAFE standards if this is found to be technically and economically feasible — new legislation providing this authority is unnecessary. Since the current Secretary and the Bush Administration in general have indicated strong opposition to tougher CAFE standards and since nothing in the Johnston-Wallop bill increases the likelihood that stronger standards will be found feasible and will be promulgated, we assume that this initiative provides no net energy savings.

In fact, the legislation contains some details that could erode energy savings if by chance tougher standards are adopted. In particular, the bill states that the percentage improvements for individual manufacturers should be determined in part by weighting sales by vehicle size class. This removes the incentive that manufacturers now have to sell small cars and the disincentive they now have to sell large cars. Also, the bill eliminates the three-year limit on carrying forward CAFE credits for cars sold starting in 1996 and it allows CAFE credits to be transferred among manufacturers.

13. Scrappage of older vehicles

Title XI also contains a provision that directs the Secretary of Energy to co-fund state programs that encourage early retirement of pre-1980 cars. But expenditures under this section are to be made from a fund established using fees collected from manufacturers that fail to meet the CAFE standards. Assuming this bill will not lead to stronger CAFE standards, there will be minimal or no fees on manufacturers for non-compliance and consequently minimal or no federal funds for promoting scrappage of older vehicles. Therefore, we assume that this provision produces zero energy savings.

Conclusion

The energy efficiency initiatives in the Johnston-Wallop bill, as proposed, are expected to result in very little energy savings. Specifically, we estimate savings of about 0.28 Quads in 2000 and 1.05 Quads cumulative during 1993-2000. The latter is only about 0.1% of projected national energy use during this period according to DOE's latest demand projections. The estimated savings in the year 2000 are about 0.3% of projected energy use that year.

Although this amount of savings is better than no energy savings, it falls far short of the cost-effective savings that are possible from an aggressive and thorough energy efficiency bill. Adopting strong new vehicle fuel economy standards (e.g., as proposed in the Bryan bill), minimum efficiency standards (not studies or labels) on lamps, motors, and transformers, new industrial energy conservation reporting requirements and savings targets, and other provisions excluded from the Johnston-Wallop bill could result in around 5 Quads of energy savings by 2000. This amount of savings is roughly 18 times greater than the estimated savings from the limited energy efficiency initiatives in the Johnston-Wallop bill.

stimated Savings from National Lamp, Motor, Commercial HVAC, and Incandescent Fixture Standards
nd from Luminaire and Office Equipment Labeling

olicy	Annual Sales (10^6)	Effec- tive Year	Percent Covered by Stds	Percent Complying w/o Stds	Avg. Life (yrs)	Watts Saved Per Unit	Total Savings in 2000 (MW)	Avg. Annual Op.Hrs	Total Savings in 2000 (GWh/yr)	Cummul. Savings 1990-2000 (GWh)	Total Savings in 2000 (Quads/yr)	Cummul. Savings 1990-2000 (Quads)
amp standards												
Fluorescent	461	1993	87%	50%	5	7	7,020	3,500	24,570	147,420	0.283	1.695
Gen'l service incandescent	793	1993	90%	30%	1	9.2	4,600	1,000	4,600	36,800	0.053	0.423
Reflector incandescent	100	1993	90%	15%	1	28	2,140	2,000	4,280	34,240	0.049	0.394
otor standards												
Polyphase	1.9	1993	64%	20%	8	280	2,190	2,676	5,830	26,235	0.067	0.302
Single-phase	113	1995	50%	5%	6	51	1,540	250	4,120	14,420	0.047	0.166
mmercial HVAC stds												
Unitary A/C	0.152	1993	100%	75%	8	2,882	870	1,100	960	4,320	0.011	0.050
Air-source heat pumps	0.067	1993	100%	75%	8	943	130	2,200	290	1,305	0.003	0.015
Water-source heat pumps	0.118	1993	100%	75%	8	1,338	320	2,200	700	3,150	0.008	0.036
Recip. chiller/air-cooled	0.003	1993	100%	75%	8	13,321	90	1,100	100	450	0.001	0.005
Recip. chiller/wtr-cooled	0.001	1993	100%	75%	8	5,000	10	1,100	10	45	0.000	0.001
Rotary chiller/air-cooled	0.002	1993	100%	75%	8	15,792	50	1,100	60	270	0.001	0.003
Rotary chiller/wtr-cooled	0.002	1993	100%	75%	8	25,010	100	1,100	110	495	0.001	0.006
Centrif chiller/air-cooled	0.001	1993	100%	75%	8	21,056	30	1,100	30	135	0.000	0.002
Centrif chiller/wtr-cooled	0.003	1993	100%	75%	8	20,808	120	1,100	130	585	0.001	0.007
uminaire labeling	45	1994	90%	NA	8	0.72	230	3,500	800	3,600	0.009	0.041
fice equipment labeling												
PC's	12.3	1995	100%	NA	5	10	620	2,000	1,200	5,400	0.014	0.062
Printers	8.8	1995	100%	NA	5	7.5	330	1,500	500	2,250	0.006	0.026
Copiers	1.4	1995	100%	NA	5	18	130	3,000	400	1,800	0.005	0.021
ncandescent fixture stds	40	1995	90%	25%	6	13.6	2,180	1,000	2,180	13,080	0.025	0.150
SUBTOTAL - Electricity							22,690		50,870	296,000	0.585	3.404
mmercial heating stds						(BTUh)	(MMBTUh)		(10^9 BTU)	(10^9 BTU)		
Gas furnace > 300 kBTUh	0.007	1993	100%	75%	8	52,636	780	1,500	1,200	5,400	0.001	0.005
Oil furnace > 300 kBTUh	0.004	1993	100%	75%	8	42,889	320	1,500	500	2,250	0.001	0.002
Gas boiler > 300 kBTUh	0.008	1993	100%	75%	8	97,723	1,520	1,500	2,300	10,350	0.002	0.010
Oil boiler > 300 kBTUh	0.009	1993	100%	75%	8	138,562	2,370	1,500	3,600	16,200	0.004	0.016
SUBTOTAL - Fuels							4,990		7,600	34,200	0.008	0.034
TOTAL											0.593	3.438

5.34'

tes:
Number installed generally based on sales in 1988 as reported to the U.S. Census Bureau.
Commercial heating sales from PNL, R&D opportunities for Comm'l HVAC Equipment, 1987.
Office equipment sales, energy use and operating hours estimated from Norford et. al., Annual Review of Energy, 1990.
Incandescent fixture sales assumed to be 5% of lamp sales (i.e., avg. fixture has a life of 20 years).
Percent covered by lighting standards based on studies for Massachusetts. Other coverages estimated by ACEEE.
Avg. life estimated from manufacturers catalogs. Life capped at number of years between standard effective date & 2000.
Savings and operating hours per unit from MA lighting studies, ACEEE motors book, and ACEEE/NYSEO Achievable Potential study.
Luminaire and office equipment labeling assumed to reduce average electricity use 1% and 10% respectively.
Incandescent fixture standards assumed to lead to 1/4 of new fixtures using compact fluorescent lamps.
Commercial HVAC savings assume improvement from ASHRAE 1989 level to 3% above ASHRAE-1992 level.
Commercial HVAC operating hours generally based on GRI, Commercial Appliance Energy Use Update, 1986.
kW savings are non-coincident and are the product of all of the previous columns (an adjustment is made for single-phase motors).
kWh savings are at the end-user level and are product of kW savings and operating hours (an adjustment is made for single-phase motors).
This analysis only includes initial standards & does not include revised standards that may be promulgated in the late 1990s.
11,500 BTU/kWh assumed.
Totals may not sum due to rounding.

WRITTEN TESTIMONY OF THE
AMERICAN PETROLEUM INSTITUTE (API)
S. 341 (NATIONAL ENERGY SECURITY ACT OF 1991)
APRIL 10, 1991

INTRODUCTION

The American Petroleum Institute (API) is a trade association representing over 250 companies engaged in the exploration, production, refining, transportation, and marketing of crude oil and petroleum products. We appreciate the opportunity to present the petroleum industry's views on the used oil recycling provisions of the National Energy Security Act of 1991 (S.341).

Our members are committed to resource conservation and environmental protection. Used oil recycling provides an excellent opportunity to conserve resources and protect the environment, since used oil can be used for its energy value or re-refined to make petroleum products.

A successful recycling program must include:

1) A prohibition on listing or identifying used oil as a hazardous waste.

2) Cost effective and environmentally protective management standards for the collection, transport, and recycling of used oil.

3) Participation by State and local governments. A program should recognize established public and private sector collection and recycling activities.

We endorse the bill's prohibition of the designation of used oil as a hazardous waste and the bill's flexible approach that would allow broad participation of all parties who can beneficially and safely recycle used oil. API does not support a credit system such as that required in S.341 which would obligate producers of lubes to recycle an increasing percentage of used oil, as the credit system does not directly address the critical issue of increasing used oil recycling by the Do-It-Yourselfer (DIYer). State and local recycling programs, which address the particular needs of a localized recycling system, should be encouraged as these programs have a greater potential to increase the amount of DIYer used oil recycling. In support of these State and local programs, API is instituting a plan to promote these programs and coordinate the industry's recycling efforts with these ongoing recycling programs. Progress in these collection and recycling programs is already evident in several states.

If a credit-based incentive program is needed to encourage used oil recycling, it must be comprehensive. It must increase the amount of DIYer used oil collected as well as provide incentives for recycling. The program must encourage participation by those who can recycle used oil in environmentally acceptable ways without creating artificial subsidies for certain types of recycling. All recycling activities should be treated equally, and should receive the same amount of credit for recycling, whether the used oil is re-refined, reprocessed, or burned for energy recovery.

S.341 ISSUES

Hazardous Waste Classification

API supports the bill's provision which prohibits the designation of used oil as a hazardous waste as this provision is an essential part of any used oil recycling program. A recycling program's viability could be seriously eroded by EPA or a state designating used oil as a hazardous waste.

A. EPA Concerns

The Environmental Protection Agency (EPA) has long recognized that classifying used oil as a hazardous waste would be detrimental to recycling. Such a designation could, in fact, lead to net environmental harm. In its November 1986 decision not to classify used oil as a hazardous waste, EPA stated:

> [w]e have determined that listing [used oil being] recycled would discourage recycling of used oil. Our further concern is that the displacement of this used oil from recycling could cause an increased quantity of used oil to be disposed of in uncontrolled ways, causing harm to the environment. This increased disposal could result from decreased use of used oil as fuel by industrial burners and decreased acceptance of do-it-yourselfer oil by service stations (and similar establishments)...

(51 Fed. Reg. 41901 (November 19, 1986)).

Even though the Agency recognizes the likely detrimental impact on the collection and recycling of used oil via the classification of used oil as a hazardous waste, EPA has been prohibited by the courts from using this stigma argument and remains under a mandate from the Court of Appeals for the District of Columbia Circuit to determine whether used oil should be classified as a hazardous waste.

B. State Experience

When used oil is classified as hazardous waste, handling costs escalate and the number of collectors and collection facilities diminish. For example, California legislation that became effective in 1987 instituted stricter controls over the disposition of used oil as a hazardous waste. By 1988, the cost to the public for handling used oil increased from $0.10/gallon to $0.40/gallon. The number of used oil haulers dropped from 121 in 1982 to only 81 in 1988. The loss of collection facilities was even more dramatic: California lost half of its used oil collection facilities between 1985 and 1988. (Source: Used Oil Recycling in California (draft), California Waste Management Board, January 1990.

The California Waste Management Board recognizes these trends may be due to the designation of used oil as a hazardous waste. Among the reasons cited by the Board for these trends are the cost of hazardous waste liability insurance to haulers, liability concerns of collectors, and the high cost for recyclers to obtain permits. While the Board noted there have been increases in the amount of used oil collected in California since the new used oil legislation took effect, it stated the increases could be attributed to the law's new reporting requirements and not to actual increases in the amount of used oil collected. (Ibid).

C. Disincentives Under RCRA

If used oil is classified as hazardous under the Resource Conservation and Recovery Act (RCRA), there would be significant disincentives to recycling it.

- Many service stations, convenience markets, vehicle repair shops, public entities, and other potential collectors could be required to obtain permits to store used oil. Rather than incur higher costs (from recordkeeping, permitting, and insurance) and liabilities of becoming hazardous waste collectors, the majority will likely refuse to collect used oil, particularly from do-it-yourself (DIYer) oil changers. The result (as EPA recognizes) would result in more used oil improperly disposed.

- Petroleum refineries, which are already heavily permitted, would likely need additional RCRA permits (or permit modifications) to reprocess used oil. Permitting a refinery under RCRA would be expensive to industry, strain EPA resources and not increase environmental protection.

Flexibility and Equity

EPA estimates about 400 million gallons of used oil are improperly disposed of every year. To recover the most used oil, any program must encourage participation by those who can recycle used oil in environmentally acceptable ways. Used oil recycling will be maximized with the exclusion of disincentives to participate.

API supports regulatory strategies that maximize flexibility. We strongly support the bill's approach that allows refineries to recycle used oil as fuel or to make products. Individual refineries are in the best position to decide their own best use for used oil, whether as a feed stock or fuel. In both cases, beneficial recycling occurs and should continue under any new regulatory scheme. API also supports provisions which require used oil management standards for collection facilities, transporters, recyclers and reprocessors. These standards should recognize normal industry practices.

State and Local Initiatives

Numerous States and municipalities have initiated aggressive used oil collection programs, providing convenient collection centers for the Do-It-Yourselfer. API strongly supports the efforts of these states and municipalities. Progress is already evident in these collection programs and will be enhanced by the prohibition on a designation of used oil as a hazardous waste. These fledgling programs should be provided an opportunity to demonstrate their effectiveness without the impact of a credit system.

If a federal used oil recycling program is necessary, it must be comprehensive: it must remove roadblocks as well as provide encouragement for recycling. The approach in S. 341 will encourage state, local and private sector recycling programs by preventing the designation of used oil as a hazardous waste. This alone may circumvent the need for a credit based program. However, the bill does not provide ample time to collect data and monitor the progress of used oil recycling once the potential for a hazardous waste designation is removed. By providing for systematic collection and evaluation of standardized recycling data, generated through the management standards, the substantial costs of a credit program may be avoided.

BALANCING RECYCLING WITH ENVIRONMENTAL PROTECTION

A successful program will allow all facilities that can reprocess used oil safely to do so. Petroleum refineries should always be considered candidates for used oil recycling because of their inherent flexibility and existing environmental safeguards. API is implementing a plan which supports and encourages state and local governments' efforts in public education and collection programs, in addition to coordinating the industry's participation in the used oil recycling system. A crucial factor which will affect the success of state and local programs, as well as API's program, is the prohibition of a hazardous waste designation for used oil to be realized and that all reasonable recycling options be entertained.

API endorses the bill's prohibition on the designation of used oil as a hazardous waste, the establishment of cost effective and environmentally protective management standards, and encouragement of state and local recycling programs.

National Conference of State Legislatures

OFFICIAL POLICY

ENVIRONMENT

NATIONAL ENERGY POLICY

The National Conference of State Legislatures urges the federal government to develop, implement and maintain an expansive, integrated, environmentally-sensitive and cost-effective national energy policy.

The primary goals of a national energy policy should be to provide for the most efficient use of energy, to promote reliable sources of domestic energy supplies, to develop a comprehensive energy conservation strategy and to develop and promote the use of alternative, renewable energy sources. A national energy policy should ensure adequate supplies of affordably priced energy. A national energy policy should ensure the use of energy in an efficient and environmentally-sound manner so that the needs of our citizens, economy and national security interests are met. Energy independence shall be the long term goal of the United States. A balanced mix of energy sources is essential to the security and the future economic growth of the United States. It is also imperative that a national energy policy account for the effect of the use of each fuel source on the environment.

Principles

Those principles which NCSL believes ought to guide the development and implementation of a national energy policy include:

- Promotion of the most efficient and economical use of all energy resources.
- Promotion and provision of incentives for the development and optimal use of all energy resources.
- Assurance that various domestic energy sources are continually developed, maintained and stored to prevent supply emergencies and to preserve the nation's independence.
- Consideration and assessment of environmental costs and benefits for all energy resources, fuels and technologies in rendering legislative, regulatory and market decisions regarding energy production and use.
- Provision of an affordable energy supply for all citizens.
- Specification and balancing of clear lines of local, state and federal regulatory authority.
- Development of both short - and long-term strategies to provide adequate energy supplies, efficient utilization of those supplies and optimum cost effectiveness.

444 North Capitol Street, N.W. • Suite 500 • Washington, D.C. 20001 • (202) 624-5400

- Promotion of the education of school-age children regarding energy resources, consumption and production and regarding environmental protection, safety and risks in energy production.

- Assurance of expanded energy research and development and broadening of the citizenry's access to energy-related information.

- Assurance of participation of state and local officials in the development and implementation of a national energy plan and strategy.

- Avoidance of mandates, particularly unfunded mandates, upon state and local governments in order to effect a national energy policy.

- Promotion of energy conservation and efficiency and the development and use of alternative energy supplies.

Implementation

The development of environmentally-sound energy conservation and efficient supply and distribution systems requires long range planning, least-cost planning, and sustained efforts. The immediate establishment and implementation of a national energy strategy, as recommended in this document and further discussed and supported in existing NCSL policies, will assure that the future energy needs of American citizens, the United States economy and national security interests are met in an efficient and environmentally-sound manner.

Development of a national energy strategy should have at least these six principal steps: (1) a forecast and assessment of our nation's energy future and its impacts; (2) an evaluation and ranking of short-and long-term energy options available to the nation; (3) an evaluation of possible energy futures which provide greater benefits to our citizens, based upon the options ranked above; (4) development of recommendations for energy options and energy futures that the nation should pursue, with the establishment of national targets or goals; (5) evaluation and recommendation of implementation mechanisms including, but not limited to, incentives, technical assistance, educational programs, regulatory standards or guidelines to achieve the targets or goals; and (6) coordination of federal and state components, responsibilities, and authority.

The U.S. Department of Energy (DOE) should rank the energy options available to the nation. The options should be grouped by end use and not by specific fuels or efficiency improvements. The ranking of each option within a group shall reflect the market and nonmarket costs of energy saved or delivered, the relative degree of uncertainty and risk exposure, and the compatibility of each option with other national goals. Ranking should be periodically revised to reflect changes over time. Any ranking and any energy policy should include the long-term environmental impacts.

In choosing among energy policy alternatives, a cost-benefit approach should be applied in which the full long-term costs of an option in taxes, consumer energy bills, environmental impacts, security risks, and other national goals are weighed against the additional availability or conservation of energy and other long-term benefits it might be expected to generate.

Those measures involving the lowest costs, in terms of public expenditures, revenue losses, costs to consumers, and environmental or other impacts, should be considered first. Energy policy alternatives that would improve our energy security and reliability without imposing significant new costs, while balancing the need for environmental protection, should be implemented. Although the potential costs and benefits of a given proposal can be extremely difficult to estimate, this framework is valuable in setting consistent terms of debate for our various energy policy choices both now and in the future.

An effective national energy policy must include carefully coordinated federal and state components. The responsibility for developing the state components rests principally with the legislatures. Channels of communication between state legislatures and the federal government must be strengthened. In the development of a national energy policy, the federal government shall consult closely with state legislatures, shall devise mechanisms to bring state legislatures as full participants into the energy decision-making process on a continuing basis, and shall ensure the inclusion of representatives of the legislative branch of state government in all state-federal working groups in the energy area.

Conservation and Energy Efficiency

Increased energy efficiency and conservation should be considered as primary sources of energy, since both are practical, cost-efficient and essential for addressing future energy needs. Increased efficiency will decrease our reliance on imported oil, reduce the environmental impacts of fossil fuels, reduce the long-term operating costs of U.S. industries thus improving their competitiveness, slow the depletion of our finite fossil fuels and extend the time we have to make the transition to new and innovative energy technologies. Environmental concerns associated with energy policy choices can be accomplished most effectively by improving the efficiency of this nation's energy use and by making sure that choices among fuels and energy products and services reflect their true environmental costs. This principle shall apply to imported energy as well as domestic energy.

It shall be part of the energy strategy of the United States to promote energy efficiency in a variety of ways including setting or strengthening as technologies improve: Corporate Average Fuel Economy Standards for automobiles; energy efficiency provisions in building codes (including lighting efficiency standards and weatherization); home appliance and heating and cooling unit efficiency standards; waste recycling and reduction standards for industrial manufacturing; standards for conservation in electrical production and supply including cogeneration, and use of alternative energy; and a national transportation policy, emphasizing various forms of mass transit, that promotes energy efficiency. These measures impose costs as well as provide benefits and should be evaluated for adoption along the lines outlined in the implementation section. Programs must be cooperatively developed and implemented by the states and federal government working together as full partners, and should consider incentives to promote and encourage energy efficiency and development of cost-effective energy resources.

Also, the federal government shall promote energy conservation education and fund research into conservation technologies. Federal funding of energy conservation programs, including grants to states, should be enhanced.

The government's leadership role in the purchase and use of new energy efficient technologies and products shall be expanded, and all government-owned buildings shall make use of economical energy conservation programs.

In addition to the energy conservation program called for above, additional policies should be adopted, including the following:

1. Research and Development -- Priority should be given to the renewable energy resources for the long-term and to the conservation and conversion from existing fossil fuel resources in the short-term. Basic energy conservation research funded by the government shall include superconductivity studies.

2. Energy from Solid and Liquid Waste -- The conversion of solid and liquid waste after all recyclable and reusable materials are removed can make a contribution to our energy supply. A resource recovery program which utilizes the waste stream should be encouraged where economically and environmentally feasible for this purpose provided that problems with air emissions and ash residue are resolved.

3. Architecture -- Use and design of innovative building technologies, including building orientation, that enhance conservation and efficient energy usage shall be promoted.

Renewable Energy

Renewable energy sources are characterized by a broad range of technologies, costs, efficiencies and environmental concerns. Renewable energy sources include, but are not limited to, geothermal, hydropower, biomass, wind, photovoltaics and solar. Recognizing this spectrum of resources, the federal government should institute a long range, stable Renewable Energy Development Program which identifies and assists renewable energy sources from research and development through demonstration projects and commercialization in a cooperative effort among industry, higher education, and national laboratories.

Renewable energy resource development must be ranked and funded on the basis of factors including energy efficiency, economic competitiveness, environmental impacts, and technological adaptability. Part of this program, and critical to its success, is federal development of alternative technologies that improve renewable energy efficiencies, cut costs, and assist in integrating renewable energy into existing energy systems. Also needed is a translation and distribution system for international technical and marketing papers on renewable energy. The U.S. should strive to become a world leader in the use of renewable energy resources.

Energy Emergency Preparedness

The federal government should support and enhance energy emergency preparedness in order to reduce the potential impact of petroleum supply disruptions. Initial efforts should focus on strategies to prevent emergencies from occurring. Such programs shall give consideration to existing state laws and programs, and state and local officials shall be included in the federal planning process.

The national energy emergency preparedness program shall include the following principles: voluntary conservation is preferred to mandatory measures wherever possible; any mandatory response should be phased in, beginning with the least stringent measures, with gasoline rationing reserved for only the most severe shortage; and to minimize undue hardships on states and regions heavily dependent on motor vehicle transportation, rationing allotments and allocation plans should be based on state and regional needs and strategies rather than on national averages. Priority shall be given to home heating needs including home heating oil and propane, provided homes are adequately insulated.

It is essential that emergency response procedures be thoroughly and carefully tested to ensure the coordination and flow of information between energy suppliers, consumers, and federal, state and local governments. Maintenance and operation of the Strategic Petroleum Reserve (SPR) is essential to any national energy emergency preparedness plan. The federal government should fill the SPR to its authorized level. There should be continued refinement of the timely sales process for SPR oil and the continued regular testing of the SPR sales mechanism and physical drawdown capabilities. Where necessary, regional rotating product stocks or other mechanism to ensure regional availability of supplies should be established. Fuel switching capability for large energy users to reduce dependence upon a single fuel source should be encouraged.

Crude Oil

The federal government should promote the environmentally-sound production of domestic energy resources in coordination with the conservation and efficient use of energy resources, and the management of energy imports.

The federal government should promote and encourage domestic production of crude oil in an environmentally-sound manner in order to supply United States consumers with a secure source of petroleum, and provide a stabilizing influence to the world price of crude oil. Since domestic production is declining rapidly, the efficient use and conservation of these resources must be encouraged. Also, the extraction and transportation of crude oil must be done only with full safeguards for the protection of the environment. In this regard, the federal government should consider incentives for domestic exploration, maintenance of stripper wells, but excluding other extractions, and technological research for methods of enhanced oil and gas recovery that are environmentally safe and in accordance with state policy.

The federal government should ensure that energy resources are utilized in a manner that recovers the most energy value possible while assuring full protection of the environment. Similarly, it should be the strategy of the United States to alleviate oil dependency by funding research and development to perfect alternative fuels, particularly for the transportation sector and primary modes of personal transportation. Enhanced oil and gas recovery from known reserves should be promoted in an environmentally sound manner.

The federal government should manage United States imports by diversifying import suppliers, pursuing a Pan American Energy Alliance with Western Hemisphere producing nations, and opening a dialogue with suppliers worldwide.

Coal

Coal is America's leading fossil fuel in reserve. Coal holds the promise of long-term energy security for this nation. Resources of coal can be properly utilized only if we develop a technology to burn coal more cleanly, and efficiently. Because coal consumption produces carbon dioxide, conservation and efficiency must be emphasized. Mined lands should be reclaimed to an environmentally appropriate state.

It should be the goal of the United States to provide continued support for the Clean Coal Technology Program, in partnership with the private sector. Research and technology development in clean coal usage should include work in precombustion, combustion, post-combustion, and coal conversion areas with desulfurization efforts a top priority. The United States should jointly address transboundary environmental problems with its neighbor Canada. A resolution on the issue of acid rain must be reached soon and should take into account the findings of the National Acid Precipitation Assessment Program (NAPAP), the National Academy of Sciences (NAS) and other recent scientific reports. Programs should be designed to reduce the amount of sulfur dioxides by at least 50% and to reduce nitrogen oxides emitted into the air from coal burning. The solution should promote the utilization of clean coal technologies and balance costs to our environment and health with potential impacts upon the economy and costs to electricity consumers.

Since gas generated from coal can be distributed through existing pipeline systems, and since the delivery of coal in a conventional form will require extensive capital investment in plant conversion and rail transportation, coal gasification should be seriously considered as an alternative to the use of coal in a conventional manner.

The effects on local infrastructure needs and the costs of prime farmland protection and land reclamation shall be considered in the development of a national coal program. Financing of activities under the abandoned mine reclamation fund shall be accelerated, and a federal commitment to reclamation shall be strengthened. No federal policy having implications for land development or management should be adopted without accommodating the laws and views of affected states.

Natural Gas

It should be part of the strategy of the United States to include the use of clean, efficient natural gas. It should be used in a manner that sustains long-run availability. This should include the co-firing of natural gas with other fuels for efficiency or environmental purposes.

The United States should encourage domestic production of natural gas in an environmentally-sound manner. Further, the federal government should complete price deregulation by 1993 as provided in current law.

The Federal Energy Regulatory Commission should expedite decisions regarding pipeline construction serving the oil-dependent markets and should be encouraged to provide access by interconnecting pipelines to producing areas of this nation. Both producers and users of natural gas benefit from orderly transportation programs which provide competition and reliable supplies of natural gas at the lowest possible cost. The Federal Energy Regulatory Commission should take steps, to the extent the Natural Gas Act and the Natural Gas Policy Act allow, to remove the disincentives for natural gas pipelines to provide voluntary transportation of natural gas for others, and should immediately take such actions as may be necessary to provide final take-or-pay relief in the natural gas marketplace.

The federal government should fund continuing research and evaluation relative to the environmentally-sound production and use of natural gas, in order to conserve energy by improving efficiency and should promote development of alternative vehicular fuels.

Nuclear

Nuclear power is an option that should be included in the development of a national energy plan, with the utmost care taken to address concerns regarding plant safety, and the transportation, storage and disposal of nuclear waste.

A federal government program for the long term management of high level radioactive waste, funded by the generators of the waste, should be pursued in a safe, timely and cost-effective manner, with the highest priority given to the safety and technical suitability of storage or disposal sites. Such a program shall be developed in full consultation with all of the affected states. The nuclear power plant licensing process for future plant construction must be improved to ensure both public input and timely decisions, and federally standardized nuclear power plant designs should be established. However, automatic approval of nuclear power plant operating licenses should not be permitted.

It is essential that the Nuclear Regulatory Commission provide strong, centralized, and consistent administration that would improve management of the agency, expedite policy formulation, and help bring about needed reforms in licensing and regulation, that are consistent with the NRC's primary responsibility of ensuring public health and safety. Meaningful and effective state participation in public safety planning and transportation of commercial nuclear waste is necessary.

States should continue to have the right to monitor operating conditions at nuclear power plants, waste storage and disposal facilities, and to exercise regulatory authority where consistent with federal law.

Federal funding should be provided for research in the areas of waste management technologies, nuclear fusion, and plant retrofit and life extension.

Electricity

The federal government should promote energy efficiency and conservation to lower the demand for electricity. The development of sources of electric energy that are sufficient to meet national needs, secure from external threat, reliable in availability and delivery, safe relative to people and the environment, and efficient for use in homes, businesses and industries should be pursued after aggressive efficiency and conservation programs are implemented.

The electricity sector today is marked by tremendous regional diversity, especially with regard to capacity. Fuel usage also varies widely. Implementation of federal legislation that fails to recognize this diversity inevitably penalizes one region or another.

Regulatory Authority

State regulatory bodies are close to consumers, utilities, industries, and concerned for state environmental and economic well-being. State regulatory bodies are in the best position to evaluate consumer needs, questions relative to fuel choice, economic development implications, and system reliability. Additionally, the determination as to when and how competitive bidding should be employed in the expansion of electric power generation capacity or to bring on new energy efficiency resources should remain the prerogative of the states through their regulatory commissions and the affected utility companies.

NCSL strongly supports and urges the continuation of the concept of primary state responsibility and final decision authority with state legislative oversight for the approval and siting of all major energy conversion facilities, subject to minimum federal standards established only after the fullest consultation with state governments, both executive and legislative branch.

The Federal Energy Regulatory Commission should ensure that regulation of interstate wholesale markets does not impede state regulation of utility investments. Multi-state cooperation in identifying the economics of and need for additional energy transmission and generation projects shall be encouraged. Least-cost energy planning for electrical generation should be pursued at the state or regional level, wherever applicable. States should have the authority over intrastate transmission practices. There should be no further preemption of state regulatory authority nor shall federal standards be established governing state regulation of utilities. Federal regulators shall ensure full and adequate consultation with state regulators prior to the determination of federal policy.

Our nation must maintain and increase its commitment to energy conservation and efficiency, while maintaining adequate and reliable energy for economic growth. Utilities, investors, equipment manufacturers and consumers should be given legislative and regulatory incentives to promote conservation and efficiency in utility planning, equipment and appliance manufacturing and energy usage practices.

Electricity research and development efforts shall be intensified with regard to energy efficiency, superconductivity, advanced and reasonable environmental controls in power generation, and development of cost-effective renewable supply technologies.

Research And Development

The cornerstone of a national energy policy should include a broad research and development component. The federal government has already committed substantial research funds for clean coal, nuclear research, basic science and related efforts. These research and development efforts ought to be continued. These efforts, however, should be supplemented with increased incentives and federal funding for research and development projects emphasizing emerging technologies, including, but not limited to, renewable resources, energy conservation, efficient use of energy, alternative fuels and oil and gas recovery. This enhanced long-term research and development capacity should also be designed to encourage private sector participation with federal and state representatives.

Education and Information

It is essential that the nation, particularly its elementary and secondary school-age children, be made fully aware of energy use and costs, production processes, alternative energy resources and the impact energy usage has on our environment. If we are to eliminate any inefficiencies that exist as a result of current and future energy use, we must have a fully informed public. NCSL recommends that public and private sector education efforts be initiated, expanded and appropriately funded. These efforts should emphasize that significant economic and environmental benefits can be achieved through increased efficiency and conservation.

An essential step in formulating a balanced energy policy is to develop the necessary data and employ analytical methods and models to assess the productivity costs and risks of the various energy choices available to the nation. The Department of Energy, with assistance from the Departments of Defense, Treasury and State, and the Office of Management and Budget, and in conjunction with the states, shall develop this analytic base.

Transportation

National transportation strategies must include public policy initiatives directed at broadening the efficient use of our energy resources. These policy initiatives should include, but not necessarily be limited to, incentives and adequate funding for mass transit, high speed rail, magnetic levitation and other emerging transportation technologies. Public-private partnerships should be encouraged.

APPENDIXES TO FEBRUARY 26, 1991 HEARING

(Subtitle C of Title IV and Section 10003 of Title X)

Appendix I—Responses to Additional Questions

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, D.C. 20310-0103

08 APR 1991

Honorable J. Bennett Johnston
Chairman
Subcommittee on Energy
  and Water Development
Committee on Appropriations
United States Senate
Washington, D. C. 20510

Dear Mr. Chairman:

This is in response to your March 11, 1991, request for further information for the printed hearing record of the February 26 hearing on S. 341, the National Energy Security Act of 1991, Subtitle C of Title IV, concerning provisions pertaining to hydropower licensing and efficiency and Section 10003, NEPA Compliance.

In response to the request for a copy of the study entitled, National Hydropower Resources Survey, we have enclosed the following information:

- Volume I, National Hydroelectric Power Resources Study, May 1983, Executive Summary;

- Volume II, National Hydroelectric Power Resources Study, May 1983, National Report;

- Volume IX, National Hydroelectric Power Resources Study, July 1981, Potential for Increasing the Output of Existing Hydroelectric Plants.

The remaining volumes of the National Hydroelectric Power Resources Study are no longer available as the report is out of print. We believe that the volumes that we are sending contain the information you need. However, if you need information from any of the other volumes listed in the Executive Summary, please let us know, and we will make arrangements to have the information copied from the file copies of the report.

In response to your second request for information on recent studies performed by the Corps to identify potential for increasing hydroelectric production from Corps facilities, the report entitled, Directory of Corps Projects with Existing Hydroelectric Power Facilities and/or the Potential for the Addition of Hydroelectric Power, dated July 1988, is enclosed. In this report, Table 5 contains a listing of all Army Corps of Engineers projects with existing hydroelectric power facilities and a potential for the addition of hydroelectric power capacity. Table 6 contains a listing of Corps projects with Federal Energy Regulatory Commission (FERC) licenses granted but not under construction. Table 7 contains a listing of Corps projects with FERC licenses pending. Table 8 contains a listing of Corps projects without existing hydroelectric power facilities and a potential for the addition of hydroelectric power and no FERC license activity. In the main body of the report is a summary sheet for each location which contains pertinent information about the Corps facility and the potential for hydroelectric power.

We have no completed studies performed by the Corps on the potential for increasing hydroelectric power production at Corps facilities that are more recent than the July 1988 report. Studies on specific projects have been prepared in draft form or are underway at this time, but have not been completed and submitted to this office.

Sincerely,

G. Edward Dickey
Acting Principal Deputy
Assistant Secretary (Civil Works)

Enclosures

Committee Note--The material submitted has been retained in Committee files.

Department of Energy
Washington, DC 20585

April 1, 1991

The Honorable J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

On February 26, 1991, Kevin Kelly, Director of Electricity, Coal, Nuclear, and Renewable Policy, Office of Policy, Planning and Analysis testified before your Committee on S. 341, "The National Energy Security Act of 1991" (Subtitle C of Title IV) regarding Hydropower Licensing and Efficiency and Section 10003, NEPA Compliance.

Following the hearing, you submitted 2 written questions to supplement the record. Enclosed are the answers to those questions.

If we can be of further assistance to you or your staff, please contact our Congressional Hearing Coordinator Valerie Howard on (202) 586-2032.

Sincerely,

Jacqueline Knox Brown
Assistant Secretary
Congressional and Intergovernmental
Affairs

Enclosures

QUESTIONS FROM SENATOR WALLOP

Question 1:	Please provide the Committee a copy of the 1990 study entitled The Potential of Renewable Energy.
Answer:	I am enclosing a copy of the requested study for the Committee.

Committee Note--The material submitted has been retained in Committee files.

QUESTIONS FROM SENATOR WALLOP

Question 2: **If section 4202 of the bill is adopted and the unlimited license conditioning authority of federal agencies is eliminated, is it not true that federal agencies who desire to have conditions included in a hydro license would still be able to submit those recommendations to FERC, who could resolve inconsistencies between conflicting agency recommendations and determine whether their inclusion would be in the overall public interest?**

Answer: Yes, it is true. Section 4202 of S. 341 eliminates only an agency's ability to mandate a license condition. FERC would still solicit analysis, comments, and recommendations from agencies. The Federal Power Act (FPA) requires the FERC to ensure that the project as licensed will be in accord with a comprehensive plan for the development or improvement of the waterway. This considers, among other things, the protection, mitigation, and enhancement of fish and wildlife; irrigation; navigation; flood control; water supply; recreation; and the preservation of other aspects of environmental quality. The FERC is required by the FPA to recognize the expertise of the other agencies in their respective areas, and to give their recommendations due weight when balancing the many possible uses of the resource. It takes an agency with a comprehensive mandate, like FERC, to balance the many, sometimes competing, beneficial uses of the resource and decide the combination of license conditions that best serves the public interest.

United States Senate
Committee on Energy and Natural Resources
National Energy Security Act of 1991, S. 341
Responses to Questions of Senator Wallop

Gail Ann Greely
Past President, National Hydropower Association
March 25, 1991

On February 26, 1991, I testified before the Committee about the provisions of S. 341, the National Energy Security Act of 1991, affecting the hydropower industry (Sections 4201-4203, and 10003). As follow-up to the hearing, Senator Wallop asked the National Hydropower Association to respond to four questions concerning these provisions:

1. *Your written testimony identifies a number of problems hydroelectric license applicants have had with federal agencies. Are there other provisions you would like to see added to S. 341 to help prevent these kinds of problems and to streamline the licensing process?*

Yes. There are two other provisions of federal law that have been interpreted to duplicate and conflict with the licensing authority of the Federal Energy Regulatory Commission: the right-of-way provisions of the Federal Land Policy and Management Act ("FLPMA") and the "dredge and fill" permit of Section 404 of the Clean Water Act.

The Federal Land Policy and Management Act was enacted to clarify and consolidate the authority of the Bureau of Land Management to manage the public lands under its administration. Included within the legislation is a provision authorizing BLM and the U.S. Forest Service to issue rights-of-way to permit uses of the lands under their jurisdiction. The structure of the statute and its legislative history indicate that it was not intended to apply as duplicate permitting for licensed hydroelectric projects. However, BLM and USFS have interpreted the statute to require a right-of-way, in addition to the FERC license, before a hydropower project can be constructed on land they administer. (This issue is currently before the Ninth Circuit Court of Appeals.) For the BLM, which does not generally have the right to impose mandatory license conditions under Section 4(e) of the FPA, because its lands are not "reservations", the FLPMA right-of-way is an opportunity to mandate conditions that may have been rejected by the FERC as contrary to the purposes of the FPA. For the USFS, the right-of-way (or "special use authorization" in USFS parlance) is in addition to the 4(e) conditioning authority. It is also broader. Where the 4(e) conditions are limited to those that are "necessary for the adequate protection and utilization" of the reservation lands, the FLPMA permit is unbounded.

The FLPMA authority has been used by both agencies to assume control over issues beyond their expertise and legitimate interest. It has also led to conflict between the terms of the FERC license and the conditions of the FLPMA document. Such conflicts, as discussed in my testimony, lead to a regulatory paralysis that discourages hydropower expansion and hampers efficient relicensing. NHA would suggest that S. 341 include a clarifying amendment to Section 501 of the Federal Land Policy and Management Act, stating that rights-of-way are not required for licensed hydropower projects. The land management agencies would continue to participate in the licensing of projects on federal land and provide their recommendations for resource protection, but they would no longer be able to claim a duplicate licensing authority.

A second federal permitting provision that creates duplication and conflict in the licensing of hydropower projects is Section 404 of the Clean Water Act. Administered by the Army Corps of Engineers, the 404 permit has been interpreted to require review of construction activities involving the use of dredged and fill materials. It is not a prerequisite for issuance of a FERC license, but is required before certain types of construction activities can take place in navigable waters of the U.S. However, like other hydro-related permits, the Corps and the Environmental Protection Agency have expanded the scope of the permit review in recent years to require a full NEPA review of the entire project before the 404 permit will be issued. Because the 404 permit is not a prerequisite to licensing, issues of concern to the Corps and EPA may not even be raised in the licensing proceeding. Conditions in such 404 permits have expanded to duplicate and conflict with the license.

To address this problem, a provision could be added to S. 341 to have the Corps submit its 404 conditions to the FERC as recommendations for inclusion in the license. The Corps and EPA would then participate in the preparation of the FERC-led NEPA document to ensure that all relevant environmental considerations are raised and addressed in a comprehensive and consistent fashion.

2. *S. 341 would exempt hydroelectric projects of 1500 kilowatts or less from the licensing requirements of the Federal Power Act. Would you favor adding a provision to S. 341 which would make the exemption optional with the developer?*

Yes. Not all projects, even under 1500 kw in size, are appropriate for evaluation in the context of a single state permitting scheme. Projects affecting interstate waterways, on federal land, or that impact federally-protected resources may be most appropriately reviewed by the FERC as lead federal agency. Also, some states do not have in place the statutory and regulatory structure necessary to perform a comprehensive evaluation of hydropower projects. An optional waiver of FERC jurisdiction for these small projects, similar to the current exemption procedure, would permit federal agency review when federal interests were involved or when a particular state is not prepared for the task. Allowing the project proponent to exercise this option would also mean that sometimes FERC licensing would be chosen as a way of avoiding state authority and state hydropower policies. This is unlikely to be a successful long-term strategy for proponents of small projects. Choosing FERC licensing will increase the cost of small project development and, because the FERC must incorporate many state conditions and recommendations, is unlikely to "escape" state environmental protections. As an improvement over the existing exemption process, an optional exclusion from FERC jurisdiction for projects of this size makes sense.

3. *Are you aware of any situation in which a federal agency has used its 4(e) mandatory conditioning authority as a means to block a project, not just to attach reasonable conditions?*

Yes. Section 4(e) gives the federal land management agencies the authority to impose conditions on a project license, once the FERC has found that the license will not be inconsistent with the purpose for which the affected reservation was created. (See Rainsong Company, 50 FERC ¶61,079 (1990).) Although the agencies can therefore not directly ban a proposed hydropower project, they have other ways to block it. The U.S. Forest Service has attempted to stop hydroelectric projects using its 4(e) conditioning authority in two ways: 1) by attaching conditions that it knows to be inconsistent with project development; and 2) delaying submittal of 4(e) conditions knowing that lengthy delays will erode the project proponent's ability to proceed. The Committee need only ask the FERC how many applications are currently on "hold" waiting for USFS 4(e) conditions to see how the tactic of delay has been used. "Project killer" conditions have been used on a number of projects involved in the FERC's Owens River Basin cumulative impact assessment and on individual projects in other western states. The regulatory histories of the Arrowrock Dam Project (FERC #4656, conflicting and burdensome conditions imposed by both USFS and Bureau of Reclamation), the Lewis Fork Creek Project (FERC #8160, USFS imposed significantly higher instream flows in 4(e) conditions than FERC license), and the Foottrail Project (FERC #3194, USFS delays and inconsistencies in review of wilderness boundary near project and in finalizing design recommendations) provide some examples.

4. *S. 341 would designate FERC as the lead agency for purposes of NEPA compliance in cases where the FERC's authorization of facilities under the Federal Power Act may be deemed a major Federal action. It would also authorize the FERC to set time limits for other Federal agencies' participation in the NEPA process and directs the FERC to permit contractors selected by the FERC and paid by the applicant to prepare environmental documents, environmental assessments and environmental impact statements required in order for the FERC to comply with its NEPA obligations. Would this help speed the FERC licensing process without jeopardizing valid environmental considerations?*

Yes. Clarifying the FERC's status as lead agency for preparation of NEPA environmental review documents would reduce the duplication currently experienced by hydropower proponents forced to deal with several competing federal agencies. Preparation of two or three NEPA documents is expensive, time consuming, pointless and contrary to the intent of NEPA. One lead federal agency, preparing one NEPA document, with the full participation of other affected agencies, is surely adequate to address environmental considerations. Allowing the FERC to set time limits on the participation of other federal agencies in the NEPA process will reduce delays caused by failure of an agency to prepare a timely response. As long as time limits are reasonable and extensions are allowed for good cause shown, the other federal agencies have no cause to complain. If they do their jobs, all valid environmental considerations will be addressed.

The use of third party contractors to prepare the FERC's NEPA documents should also speed-up the licensing process by supplementing the FERC staff with knowledgeable, experienced personnel. If FERC's own staff remains at current levels, projects that are not processed using third party contractors could also enjoy accelerated review -- less work with the same level of resources. Third party contracting is not new to the FERC. FERC has been using contractors to prepare Environmental Impact Statements and other environmental documents for the past few years. It is a common practice among federal agencies and has been endorsed by the Council on Environmental Quality. As long as CEQ guidelines for selection and management of third party contractors are followed in the FERC's implementation of this approach, there is no reason to believe that thorough environmental review would be jeopardized.

Financing third party contractor preparation of NEPA documents raises a number of questions, however. Hydropower licensees currently finance the entire hydropower office at the FERC, including FERC's costs for NEPA review and the consultation costs of other federal agencies, through annual charges paid throughout the license term. A "direct-billed, pay as you go" approach for preparation of NEPA documents for license applicants would need to be reconciled with the current scheme. Also, consideration of "who pays" for environmental review in licensing cannot be divorced from an examination of "how it's done". Making more resources available to the FERC through third-party contracting does not address some of the duplication and inefficiency within FERC's own licensing procedures. NHA has discussed these in its written testimony to this Committee.

United States Department of the Interior
BUREAU OF RECLAMATION
WASHINGTON, D.C. 20240

IN REPLY REFER TO:

MAR 26 1991

1991
WASHINGTON, D.C. 20510

Honorable J. Bennett Johnston
Chairman, Committee on Energy
and Natural Resources
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

In response to your letter of March 11, 1991, we have listed below the recent studies that have been performed by the Department of the Interior (DOI) on the potential for increasing the hydroelectric production from DOI facilities.

- Auburn Dam Report, Bureau of Reclamation, July 1987
- Spring Canyon Pumped Storage Project, Preliminary Findings Report, Department of the Interior, Bureau of Reclamation, February 1987
- Hoover Powerplant Modification, Feasibility Report, Department of the Interior, Bureau of Reclamation, December 1982
- Diamond Fork Power System, Bonneville Unit, Central Utah Project, Plan Formulation Working Document, Bureau of Reclamation, October 1982
- Report on Assessment of Low-Head Hydroelectric Sites in the Western States, Methodology and Summary, United States Department of the Interior, Bureau of Reclamation, Tudor Engineering Company, March 1982
- Report on Assessment of Small Hydroelectric Development at Existing Facilities, United States Department of the Interior, Water and Power Resources Service, July 1980
- Solar/Hydro Integration, Department of the Interior, Water and Power Resources Service, July 1980
- Western States Inventory of Low-head Hydroelectric Sites, United States Department of the Interior, Water and Power Resources Service, Tudor Engineering Company, Volume 1, October 1980
- Peaking Power Status Report, Department of the Interior, Bureau of Reclamation, September 1978

- Report of the Western Energy Expansion Study, United States Department of the Interior, Bureau of Reclamation, February 1977
- Reclamation Potentials Within the Lake Mead National Recreation Area, Department of the Interior, Bureau of Reclamation, January 1977

Enclosed are copies of the summaries of each of the above studies.

In addition to the above studies, the Bureau of Reclamation has performed a number of preliminary assessments on increasing hydropower potential at small facilities and rewinding, uprating, and enlarging existing generating facilities.

Sincerely,

Dennis B Underwood

Dennis B. Underwood
Commissioner

Enclosures

Committee Note--The material submitted has been retained in Committee files.

Appendix II—Additional Material Submitted for the Record

SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
HEARING ON THE HYDROPOWER PROVISIONS OF S. 341
WASHINGTON, D.C. -- FEBRUARY 26, 1991

STATEMENT IN SUPPORT OF THE HYDROPOWER PROVISIONS OF S. 341

BY
GREGORY M. RUEGER
SENIOR VICE PRESIDENT AND GENERAL MANAGER, ELECTRIC SUPPLY
PACIFIC GAS AND ELECTRIC COMPANY

As the nation's largest investor-owned operator of hydroelectric generating facilities, PG&E firmly believes that the hydropower provisions of S. 341 offer important improvements to the present regulatory scheme for hydropower. These provisions are found in Title IV--Renewable Energy, under Subtitle C--Hydropower. These provisions would do much to strengthen the ability of the Federal Energy Regulatory Commission (FERC), as the responsible administrative agency in this area, to integrate the diverse considerations involved in licensing hydroelectric generation and to produce timely and comprehensive decisions.

Hydropower is the most readily available renewable energy resource in the nation today. As the nation embarks on establishing a sound national energy strategy to carry us into the 21st century, it is vital that government support efforts to enhance the ability of both the private and public sectors to preserve and expand this clean, renewable domestic resource. S. 341 will make a major contribution towards these efforts.

The hydropower provisions of S. 341 represent sound environmental and regulatory policy. All current environmental reviews and considerations in hydropower licensing will be preserved. However, overlapping environmental reviews and the possibility of conflicting agency license requirements will be eliminated. The single agency with the greatest expertise in hydropower licensing will be reaffirmed as having administrative responsibility for finding the balance among all competing concerns which best serves the public interest.

Congress designated the Federal Power Commission, FERC's predecessor, to be the agency principally responsible for hydropower. FERC still has that role, but with the expansion of factors affecting the licensing and operation of hydroelectric projects, clarification of the statute has become necessary to avoid growing regulatory inefficiencies, delays, and conflicts.

As proposed, the hydropower provisions of S. 341 would do these important things:

- Consolidate all provisions in the Federal Power Act for protecting non-power interests on hydropower licenses. Specifically, protection of resources on Federal reservations, presently addressed in Section 4(e) of the Act, would be combined with the existing protection for fish and wildlife, recreation, flood control, and other concerns of Federal and State agencies contained in Section 10(a) of the Act. Inclusion in Section 10(a) makes sense because this section requires FERC to consider agency (and Indian tribe) recommendations on all these topics as part of FERC's key responsibility to assure that hydropower projects are best adapted to comprehensively use and protect the varied resources affected by hydropower.
- Clarify the purpose and scope of the State water quality certification required for hydropower projects under Section 401 of the Clean Water Act to insure that discharges from these projects do not adversely affect water quality. It would prevent the use of this statute to regulate matters which have nothing to do with water quality.
- Eliminate the ability of the Secretaries of Commerce and the Interior to require the installation of fishways (fish passage facilities) at hydropower projects, leaving this to the discretion of FERC in the licensing process.
- Direct several departments to identify cost-effective opportunities to increase hydropower production at existing federally owned or operated dams and similar facilities.

Attached to this statement is a background document summarizing the importance of hydroelectric power to PG&E and regulatory problems which S. 341 could help remedy.

Attachment

Attachment

The Importance of Hydroelectric Power to PG&E

Hydroelectric power is a significant part of the U.S. electric generation mix, providing about 12 percent of the capacity and 10 percent of the energy needs, nationwide. At PG&E, hydro is a very substantial component of our resource mix, at about 4 million kW. Hydro provides about 25 percent of our capacity and roughly 20 percent of our energy production, in a normal precipitation year. Even in a dry year (and California is now in the fifth year of drought conditions), hydro can still generally be counted on for 8 to 10 percent of our energy production.

Hydro potential nationwide was estimated by the Federal Energy Regulatory Commission (FERC) in 1988 at perhaps double (an additional 95 million kW) the hydro capacity currently existing nationwide (88 million kW). About one-fourth of this potential is estimated to be pumped storage. We believe that simplifying and streamlining the regulatory process is essential to helping these estimates to be realized.

Hydro's economic benefits to electric consumers are significant. Average hydro production costs are significantly lower than most thermal alternatives. As a significant component of our resource mix, hydro buffers swings in the cost of other resources.

Hydro's operational benefits include the ability to start, change load, and stop rapidly when compared with other resources. These features are valuable during normal operation as "spinning reserve" and also during emergencies when quick response is even more valuable. Pumped storage units provide unique flexibility to system dispatchers because they can swing from full power to full pump in a relatively short time period.

PG&E's Helms Pumped Storage Project combines the ability to generate 1.2 million kW of electricity to help meet peak electrical demand, with the ability to absorb a comparable amount of electric output during non-peak periods by switching to its pumping mode. This enables efficient baseload generation sources to operate around the clock, even during the otherwise low-load off-peak periods. In addition, the Helms Project can go to full load in just 5 minutes.

Another significant operating benefit of hydro systems is their ability to store water for hours, days, months or for years in reservoirs for power use when it is of highest economic benefit.

Hydro provides societal benefits at its reservoirs which provide flood control, aesthetic, and recreational appeal to millions of Americans. PG&E has been in the hydropower business since the late 1800's. Our oldest operating hydro unit was commissioned in 1900 and our newest in 1986. We have over 80 public recreation facilities at hydro projects, with about 400,000 visitor-days of use annually.

Hydro provides these benefits without producing air pollution or many of the other waste products characteristic of other resources. To illustrate, if the electrical output of PG&E's hydroelectric system in an average precipitation year were provided instead by a typical coal-fired generation system, it would produce in excess of 100,000 tons per year of sulfur oxides (SOx); PG&E's hydro resources contribute zero SOx. Hydro does have some environmental impacts. Design and operational attention can minimize them but not eliminate them all. They are, however, fundamentally different, and thus not directly additive, with other resources' impacts. We view this as a desirable attribute of hydroelectric resources.

Regulatory Problems Which S. 341 Could Help Remedy

The current and future benefits of hydro are in jeopardy because of the regulatory process for hydro licensing. The process is inefficient, with considerable duplication of effort. Each state and federal regulatory agency pursues the goals it perceives to be its responsibility.

The current regulatory process fails to clearly establish a single agency as the responsible decision maker. While FERC has the authority to issue licenses for hydroelectric projects, other federal and state agencies and single purpose special interest groups attempt to elevate the importance of their goals in the FERC licensing process.

With multiple agencies having multiple opportunities to push their differing goals, we are concerned with the possibility of requirements for studies and mitigation which exceed project impacts and whose costs exceed the benefits of hydro generation. If this results in hydro projects being rendered uneconomical, existing generation may be lost and the growth of this desirable generating resource would certainly be slowed.

Difficult decisions must be made in balancing energy needs, consumer economics, and resource protection. A regulatory framework in which a single agency is clearly entrusted with overall jurisdiction and the responsibility to make those difficult decisions is the best way to ensure that a proper balance is struck. We support a re-affirmation of the Federal Energy Regulatory Commission as that jurisdictional agency. S. 341 will make a major contribution toward this goal.

Here is one example of a current regulatory jurisdictional conflict. The federal land management agencies, including the Department of the Interior's Bureau of Land Management and the Department of Agriculture's Forest Service, are actively promoting their position that they can regulate all aspects of hydro projects and supersede FERC's best comprehensive planning authority via their mandatory conditioning authority under Section 4(e) of the Federal Power Act. S. 341 would address this 4(e) jurisdictional conflict between federal agencies.

. . . . .

A STATEMENT BY THE
NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION
BEFORE THE ENERGY AND NATURAL RESOURCES COMMITTEE
UNITED STATES SENATE
NATIONAL ENERGY SECURITY ACT OF 1991
FEBRUARY 26, 1991

Mr. Chairman, my name is Morgan Dubrow, Chief Engineer of the National Rural Electric Cooperative Association (NRECA). NRECA is the national association of more than 1,000 rural cooperatives which supply central station electricity to some 25 million people in the rural areas of 46 states.

This statement sets forth NRECA's positions on S. 341, Subtitle C -- Hydropower Sections 4201, 4202 and 4203 of the "National Energy Security Act of 1991."

Mr. Chairman, since its enactment in 1920 the Federal Power Act [and subsequently the Federal Energy Regulatory Commission (FERC)] has provided for the licensing of hydroelectric power projects, customarily for a term of 50 years. Such licenses include stipulations to require the licensees to provide for minimum flows; fish and wildlife protection; provisions for recreation; some conservation measures, and other requirements to maximize the overall benefits of the project. Further, in many instances such projects provide some flood control and navigation benefits. Having accounted for these things, the FERC provides assurances, or guarantees, to licensees warranting that the project can be operated in such a way that the electric power can be produced and marketed at rates that repay all project costs. Such a provision is essential -- otherwise the project would not be built.

NRECA supports Sections 4201 and 4202 of S. 341 which strengthen the licensing provisions of the Federal Power Act to operate the project for maximum power production within the stipulated terms and conditions set forth in granting the license.

The federal government has developed many multiple-purpose projects and in so doing has attempted to adequately provide storage municipal water supply and irrigation for flood control, and navigation, as well as recreation, conservation, protection of fish and wildlife, etc. The Colorado River Storage Project (CRSP) is one such project and it includes a very large storage dam, namely Glen Canyon. This project stores water for the Colorado River which over the past 100 years has experienced flow which ranges from about 5.4 to 24.0 million acre feet (MAF) yearly. The average flow is 11.9 MAF. Glen Canyon provides for flood protection, municipal water and irrigation storage and other purposes. The reservoir includes a power pool designed and operated for the production of peaking power. This power operation provides annual revenues to pay over 90 percent of the project costs.

NRECA supports the present method of power operations and so indicated in testimony before the Senate Water and Power Subcommittee on the so-called "Grand Canyon Protection Act" on July 24, 1990, in which we stated:

> **NRECA recognizes that society's needs and interests shift over time. Government should address those changing circumstances. Water rationing in California communities is a problem for all of us to help solve, because we may have a bigger problem next time. Recreation is essential for society and can provide commercial economic opportunities in rural areas. However, changing basic federal policies for managing water ought to be done through**

a process like that advocated by Senator Hatfield in S. 1996. It should not be done to accommodate rafters under the "smoke screen" of an emergency condition to avert major damage to the Grand Canyon.

NRECA continues to believe that clean, renewable hydro-power serves the national interest and its production should be emphasized over less clean sources. Glen Canyon Dam, with a capacity of 1356 MW, supplies power to 58 rural electric cooperatives and other preference customers in the Upper Colorado River Basin. Moreover, the Glen Canyon powerplant supplies about 70 percent of all the power that can be generated at Colorado River Storage Project (CRSP) dams in the upper Colorado River Basin. Glen Canyon power is co-mingled with large amounts of power from fossil-fired plants to serve residential farms and ranches; however, despite this co-mingling of relatively inexpensive hydropower, the rates for these preference customers are still high.

To the extent that water flows from Glen Canyon are changed to levelize the flows as prescribed in S. 2807, the electric capacity and energy will have to be replaced with fossil-fueled units. That appears to be the opposite of the direction Congress and the Administration are taking in the clean air deliberations.

Furthermore, it would mean that the ranchers' and other rural customers' overall power bills would increase as much as $30 million each year.

NRECA also supports Section 4203, "Improvement at Existing Federal Facilities." This Section is designed to have the Secretaries of the Interior and the Army "perform studies" of cost effective opportunities to increase hydropower production at existing federally owned or operated water regulation, storage and conveyance facilities. Studies are to be performed for each of the nation's principal river basins to seek opportunities to improve efficiency of hydroelectric generation use of water, create additional generation of hydroelectric power, with due consideration of the cost effectiveness of such efforts with full and due consideration of the environmental consequences.

Thank you for the opportunity of presenting NRECA's views and recommendations on this important proposed legislation.

STATE OF CALIFORNIA

Pete Wilson, Governor

STATE WATER RESOURCES CONTROL BOARD
PAUL R. BONDERSON BUILDING
901 P STREET
P.O. BOX 100
SACRAMENTO, CALIFORNIA 95812-0100
(916) 324-7963

FAX: (916) 322-2765

FEB 25 1991

Honorable J. Bennett Johnston, Chairman
Senate Energy and Natural
Resources Committee
United States Senate
Washington, DC 20510-1802

Dear Chairman Johnston:

SENATE BILL 341 HYDROPOWER PROVISIONS

On Tuesday, February 26, 1991, the Senate Energy and Natural Resources Committee will conduct a hearing regarding the hydropower provisions of S. 341. These include a provision, Section 4201, which would effectively take away state authority to apply its water quality requirements to hydropower projects licensed by the Federal Energy Regulatory Commission (FERC). This section should be removed from the bill.

I. To Assure Coordinated Regulation of Factors Affecting Water Quality, States Must Have Certification Authority

Hydropower projects have the potential to substantially affect water quality. Problems include changes in temperature, turbidity, dissolved oxygen and algal productivity caused by dam operations, and siltation caused by project construction. These problems, if not avoided through appropriate permit or license conditions, may completely destroy the fishery in affected rivers and streams.

The states must have authority to address these impacts if water quality is to be protected. As is recognized in the California Water Code, achieving water quality standards requires "the coordinated control of all factors which affect water quality." (Cal. Water Code § 13141(c).) FERC does not have the ability to achieve this kind of coordinated control. FERC has jurisdiction over only about 500 of the over 14,000 water projects in California, and no authority over other factors, such as municipal, industrial and agricultural discharges, which affect the same waters.

Until recently, the California State Water Resources Control Board relied on water right permit conditions, including conditions in the state permits issued to FERC licensed hydroelectric projects, to assure coordinated regulation of factors affecting the State's water resources. But a recent United States Supreme Court decision (California v. FERC) severely limits state water right authority over FERC licensed projects.

States still have some authority to apply their water quality requirements to FERC licensed hydroelectric projects under Section 401 of the Clean Water Act. Any federal permit or license for an activity which may result in a discharge is subject to state certification. The State may impose as a condition of certification any appropriate requirements of state law. These conditions must be included as conditions of the federal license. Section 401 of the Clean Water Act is not the answer to the U.S. Supreme Court's decision. The State's concerns often go beyond water quality impacts, and even as applied to water quality the procedures governing certification often make it difficult for the State to regulate effectively. Nevertheless, Section 401 is a valuable tool for the protection of water quality, and may be the only means available to the State to ensure it has some say over the water quality impacts of hydropower projects.

II. S. 341 Would Effectively Eliminate State Certification Authority

The provision of S. 341 on 401 certification, Section 4201, would severely limit the State's ability to protect water quality through use of its certification authority.

Section 4201 of the bill would prohibit the State from imposing any condition of certification which is not "needed" to ensure that the construction and operation of the project will comply with specified sections of the Clean Water Act. These sections include Section 303 of the Clean Water Act, which provides for beneficial use designations and water quality criteria. Section 4201 would further provide that FERC will decide if the State's conditions of certification violate this prohibition. Under current law, the validity of the State's certification conditions is reviewed in state court.

State certification authority would be all but useless if FERC could ignore the State's certification conditions whenever FERC determines those conditions are not "needed" to meet Clean Water Act requirements. FERC has interpreted Section 303 of the Clean Water Act more narrowly than either the State or the federal Environmental Protection Agency (EPA), excluding many characteristics of water from its definition of "water quality".

FERC could also use the authority provided by S. 341 to second guess the State's determination of what controls are appropriate to meet water quality standards. For example, if the State sets certain conditions to meet turbidity criteria, FERC could reject those conditions on grounds that the State should instead meet those criteria through stricter controls on agricultural or silvicultural activities. FERC may also interpret S. 341 to allow it to second guess the State's water quality criteria and beneficial use designations. FERC could reject the State's criteria as more restrictive than necessary to protect the fishery, or reject State's designation of the fishery as a beneficial use to be protected.

Setting water quality standards often requires careful judgment about competing needs for limited water supplies. For example, where water quality standards cannot be achieved without increasing instream flows, it must be decided whether meeting those standards is feasible considering the impact of higher instream flow requirements on water projects. The Clean Water Act and EPA regulations assign these determinations to the states. Under S. 341 these decisions would be made by FERC. FERC has shown a strong interest in promoting hydropower, and an inadequate understanding of competing needs of other uses. If the hydropower provisions of S. 341 are enacted, the states will find that standards set to protect municipal, industrial, agricultural, or instream beneficial uses may be ignored whenever FERC believes those standards would interfere with operation of a hydropower project.

In addition to taking away state authority, S. 341 would include another provision, Section 4202, taking away the authority of federal land management agencies over hydropower projects within the lands they manage. The combined effect to taking away both state authority and the authority of the federal agencies primarily concerned with the environmental impacts of hydropower projects could be severe damage to rivers and streams in California.

III. The Nation's Energy Needs Do Not Require Limitations on State Authority

The hydropower projects which would benefit by taking away state certification authority will not significantly contribute to the nation's energy supply. The hydropower projects in California now pending for water quality certification and FERC licensing tend to be small, run-of-the-river projects. Although these projects may have significant impacts on affected rivers or streams, they do not generate much electricity. Because stream flows vary greatly from season to season and year to year, these projects are not a reliable source of energy. Further, most of the electricity is generated during spring snowmelt, when power demands are lowest and power from other sources, including other hydroelectric projects, is most abundant.

The additional electricity generated by these projects is a tiny fraction of the energy that could be saved through additional conservation. For example, the California public utility likely to obtain the most additional power from new hydroelectric projects in the next several years is the Pacific Gas and Electric Company (PG&E). Yet a recent California Energy Resources, Conservation and Development Commission report, Electricity Report 90, projects that new hydropower projects will add only 10 megawatts of power to the PG&E system in the next several years. By contrast, the report's recommended energy forecast indicates that conservation measures reducing demand on the PG&E system by over 1100 megawatts should be carried out over approximately the same period.

This fifth year of drought has highlighted a need for coordinated regulation for water projects in California. The hydropower provisions in S. 341 would be a step in the wrong direction, and provide little or no benefit to meeting the nation's energy needs. The bill should not include any limitation on state authority over hydropower generation.

Sincerely,

W. Don Maughan
W. Don Maughan
Chairman

Note: Same letter sent to Senator Alan Cranston
and Senator John Seymour

Statement
# of the
AMERICAN PUBLIC POWER ASSOCIATION
Submitted to the
Senate Committee on Energy and Natural Resources
regarding Sections 4201, 4203 and 10003 of S. 341,
The National Energy Security Act of 1991

February 26, 1991

The American Public Power Association, the national service organization representing nearly 1,750 local, publicly owned electric utilities, submits this statement to the Senate Committee on Energy and Natural Resources, in support of the streamlined hydroelectric licensing procedures contained in "The National Energy Security Act of 1991 (S. 341).

Hydro generation is important to the public power industry. Hydro facilities constitutes nearly 23 percent of public power's total installed generating capacity. Public power generally supports the hydroelectric licensing provisions contained in S. 341. We believe that the proposed changes to the FERC relicensing process would streamline the approval process, eliminate duplicative project review, and reduce opportunities to delay unnecessarily or deny project licenses. Increasing the availability of hydropower is an important and obtainable goal -- one that is certainly in keeping with our national policy objectives of reduced dependence on foreign oil and increased production of renewable domestic energy resources. APPA commends Senators Johnston and Wallop for their leadership on this issue, and we urge the Committee to include streamlined and consolidated licensing provisions in the final measure reported to the Senate floor.

The Regulatory Process Has Broken Down

The FERC hearing process is currently riddled with obstacles that neither promote the best use of the nation's natural resources nor encourage sound energy production. Simply put, the regulatory process has broken down, exhausted by the sheer weight of conflicting federal and state regulatory demands with no one agency fully at the reins.

Prior to the enactment of the 1986 Electric Consumers Protection Act (ECPA), the Federal Energy Regulatory Commission (FERC) was fully empowered under the Federal Power Act to consider proposed project applications primarily on the merits of what constituted the most appropriate energy policy and best use of a public waterway. ECPA altered the licensing process to ensure coordination of important environmental and land use consideration with FERC's energy policy considerations on project development. Under ECPA, both energy and natural resource policies were given equal weight in the FERC approval process.

Today, before acting on a license application, FERC must solicit recommendations from state and federal agencies having jurisdiction over flood control, navigation, irrigation, recreation, cultural and other resources, and from Indian tribes affected by the project. While FERC can deny the recommendations for certification of anyone of these agencies if it determines that the condition is inconsistent with the purposes of the Federal Power Act, before doing so it must try to resolve the difference with the agency, giving due weight to the agency expertise. Should FERC find that the agency's requirements were inconsistent with the Federal Power Act, it is required under law to publish its findings, including its rational for alternative policy requirements. This process provides considerable input for state and federal agencies. Yet, these agencies are increasingly using other authorities to undermine the licensing process. The problem with the current process is that, while FERC is theoretically in the driver's seat, other state and federal resource agencies control the traffic lights.

Section 401 of the Clean Water Act has been a particular problem and a source of tremendous abuse. Under Section 401, hydropower license applicants are required to obtain certification from the state water quality agency that the proposed project complies with state water quality standards. Any conditions of the state certificate are then incorporated into the project license. Many states have included conditions as part of this process that go far beyond water quality. For example, Section 401 certifications in New York have contained conditions on dam safety and facility maintenance, recreational uses, and aesthetics. A small project in California was required under the Section 401 process to provide a plan for the protection of wolverines and mule deer from disturbance during the construction process.

These conditions went far beyond the requirements of water quality. That is not to suggest that the concerns are not legitimate. However, the proper consideration of these issues should be accomplished during the licensing process at FERC. Not through a separate licensing process at the state agency level.

Conditions like these are slowly being challenged in the state court, and in four cases to date, the courts have construed the Section 401 mandate narrowly. In Maine, for instance, the state court reversed the state agency's denial of Section 401 certification. In rendering its decision, the court said, "a mandate to promote design and construction of additional recreational facilities or fish passage facilities to revitalize uses disrupted by dam construction 85 years ago is not within the powers assigned to the Board by Maine's water quality laws." It went on to say that "the water quality certification process is not a broad enough legislative mandate to achieve such goals."

The problem with the Section 401 process is that if an applicant does not accept state conditions to the satisfaction of the state agency, the certification is denied and FERC cannot issue the license. Under FERC's current policy, two Section 401 denials gets a license application thrown out completely. In effect, the Section 401 requirements have veto power over the licensing process.

APPA does not question the value of coordinating the policy objectives of environmental statutes, or belittle the responsibility of appropriate state and federal agencies to steward the nation's precious resources. However, ensuring that natural resources are used for the maximum public benefit requires that one agency, not a multitude of agencies, has the ultimate authority review the project and render a decision.

S. 341 Clears the Regulatory Logjam

Provisions under The National Energy Security Act of 1991 (S.341) will reduce the regulatory logjam by streamlining the process and removing potential barriers from the approval process. Streamlining is not achieved at the expense of our environmental goals. S. 341 does not eliminate a single opportunity for state and federal resource agencies to participate in the licensing process, nor does it undermine the deference that Congress accorded fish and wildlife agency recommendations in ECPA. The proposal does not release FERC from giving "equal consideration" to non-development values. What it does do is put hydropower back into the resource planning picture.

Section 4201 addresses the problem with the Section 401 certification process by prohibiting states from including conditions in certifications that are not needed to protect water quality. It authorizes FERC to disregard those requirements outside of this scope. FERC's decision would still be subject to judicial review.

Section 4202 removes the authority of federal land agencies administering federal reservations to condition the license for hydropower projects, yet still requires FERC to consider the issues concerning the protection and utilization of the federal lands in the licensing decision, leaving the final decision up to FERC to evaluate the overall public interest. This section also deletes the provisions requiring mandatory fishway prescription, replacing them with a more flexible requirement that FERC must consider the recommendations of the National Marine Fisheries Service and U.S. Fish and Wildlife Service. FERC's decisions in both cases would still be subject to judicial review.

Other provisions within S. 341 remove barriers caused by the National Environmental Policy Act (NEPA), speeding up the consultation process. APPA endorses these changes. S. 341 puts FERC back into the driver's seat in the hydro licensing process. These changes make perfect sense; most importantly, they return the reins to FERC, while striking a reasonable balance between the goals of environmental concerns and energy policy. We applaud these provisions.

Exemptions of Small Projects Not Needed

One provision we urge the committee to reconsider is the provision under Section 4202 which excludes hydro projects under 1.5 MW capacity from FERC licensing jurisdiction. We do not believe that it is necessary to provide a statutory exemption. FERC currently has the regulatory authority to exempt, upon request, small hydro projects from the licensing process. We believe that it is unwise to give a blanket exemption from meeting important environmental and land use policy objectives. FERC has the flexibility under current law to issue these waivers on a case by case basis. APPA believes that this flexible regulatory approach is more appropriate. An exemption would insulate projects under 1.5 MW from competition with opposing applications that might propose better use of the resource. Further, providing an exemption could lead to underdevelopment of certain sites by applicants intentionally designing projects to get out from under FERC regulation.

Support for Federal Hydro Studies

Existing power from federal hydro projects is sold with a first right of purchase to public power systems and rural electric cooperatives. This is an important resource for these 1,100 consumer-owned systems. Many existing facilities are being downrated by environmental concerns, drought, and poor maintenance. APPA welcomes efforts to maximize existing resources through upgrades and additions. We endorse the study provisions contained in S. 341, because we believe that these studies will lead to important improvements within the federal power system.

Conclusion

APPA believes that the proposal under consideration, S. 341, is a modest approach to streamline a currently unworkable process, while striking the appropriate balance to meet important environmental protections. We commend the sponsors for their foresight and recognition of the importance of placing balance back into the hydro licensing process. The Association stands ready to work with the committee as you fine-tune this legislation, and we would be happy to provide the Committee with any additional information as you deliberate these much needed provisions.

SUPPLEMENTAL TESTIMONY OF GAIL ANN GREELY
PAST PRESIDENT OF THE NATIONAL HYDROPOWER ASSOCIATION
REGARDING SECTIONS 4201 - 4203 AND 10003 OF S. 341,
THE NATIONAL ENERGY SECURITY ACT OF 1991

BEFORE THE
SENATE ENERGY COMMITTEE

February 26, 1991

Introduction

On February 26, 1991, I testified before the Senate Energy Committee regarding the provisions of S. 341, the Johnston-Wallop National Energy Security Act, that affect the regulation of America's hydropower resources. In response to some of the questions that arose during the hearing, I would like to offer a short supplement to my prepared testimony.

What has happened to hydropower development over the past decade?

The package of legislation associated with the last national energy crisis, including the Public Utility Regulatory Policy Act, was intended in part to spur the development of domestic renewable energy resources, including small hydropower development. In response, there was an avalanche of applications to the Federal Energy Regulatory Commission for preliminary permits for small hydropower development in the early 1980's. Very few of those preliminary permits, however, have resulted in the construction of new hydroelectric capacity. Understanding the causes of that failure is important in formulating this next generation of energy legislation.

Certainly, changing electricity prices had a lot to do with the failure of so many projects to go forward through licensing and construction. Hydropower projects are fuel-free and generally low-maintenance, but they are capital intensive. Construction costs generally include not only the water-regulating and generating facilities, but also substantial investment in environmental protection and enhancement. As a result, hydropower projects generally require power purchase contracts with higher "front end" returns than comparably-sized fossil-fired generators. Since 1980, energy prices and contract terms have varied enormously from region-to-region and year-to-year. Power purchase prices generally rose through the early-1980's, fell toward the end of the decade, and are now beginning to climb once again. Hydropower projects that came through the licensing process quickly and were able to secure solid power purchase agreements and tax incentives in the early part of the decade were constructed. Projects that were "stalled" and could not take advantage of favorable utility contracts and tax credits were forced to withdraw their applications or surrender their licenses or exemptions.

Timing was, and is, key to successful development of a project. The F.E.R.C.'s licensing process was changing along with the financial considerations. The exemption process, created by Congress, was struggling through court challenges that held up many projects for years. Challenges to the F.E.R.C.'s N.E.P.A. implementation delayed others and eventually led to the implementation of the current three-stage consultation process. Many of the early hydro project proponents, and the state and federal agencies with which they dealt, were new to the federal regulatory process. In response to the large number of pending applications, the participating agencies sought to develop new methods to exercise greater control over project development, creating the jurisdictional conflicts that characterize the current process. As a result, predicting the timing, the cost and the outcome of hydropower applications became more and more difficult. Some projects made it through the process, but were by then unable to secure the necessary power contracts and financing. Other projects had been so changed by the process, that they were no longer viable. Still others survived the F.E.R.C. process, but were unable to obtain other state and federal permits, or faced so many conflicts between competing agencies that the project could not proceed. Many simply "died on the vine" – essentially abandoned by project proponents caught up in the regulatory morass.

Some of the factors leading to the failure of so many proposed hydropower projects were part of the "shake down" of the changing energy marketplace. Both utilities and independent power companies alike now have more experience with power marketing and licensing realities. Higher licensing costs (up by 300%, according to Mr. Hunt's testimony) and continuing regulatory uncertainties have made project proponents much more selective. Even though power prices are predicted to climb in some regions over the next few years, the number of preliminary permit applications at the F.E.R.C. is showing only a modest increase.

So, how does S. 341 help to promote more hydropower?

Although S. 341 does not raise power prices, it does respond to other important factors impeding further hydropower development. It's regulatory reforms will give project proponents greater confidence in their ability to complete the permitting process and bring projects on-line when market conditions are right. Central to its effect is the way it reduces regulatory uncertainty. By limiting the ability of the states to use the Section 401 water quality certification to block projects, and authorizing the F.E.R.C. to decide what water quality conditions must be included in the license, S. 341 assures the project proponent that he will not be stalled indefinitely waiting for a 401, or side-tracked to the state courts for year, or subjected to contradictory non-water quality conditions. By transforming Section 18 fishway prescriptions into fishery recommendations under Section 10(j), S. 341 allows the project proponent to look to the F.E.R.C. for a final decision on fish and wildlife measures – a decision that must balance fishways against other public interests, including power generation. By clarifying the F.E.R.C.'s status as lead agency for N.E.P.A. compliance, S. 341 reduces the risk of costly and lengthy duplicate environmental reviews by various federal agencies.

S. 341's hydro provisions eliminate unnecessary, conflicting and duplicative processes that hydro proponents have been forced to factor into their decisions, in the form of increased development cost and greater uncertainty. This high level of regulatory cost and uncertainty does not afflict other energy technologies. S. 341 levels the playing field, so that hydropower proponents can evaluate their projects based on essentially the same factors as those faced by gas-fired combustion turbines or wind farms.

The National Hydropower Association believes that this is an important and responsible goal of national energy policy – to eliminate unnecessary barriers to renewable energy development so that the forces of the marketplace can select the best mix of generating technologies for the future. We believe that once hydropower is evaluated in a fair competition among energy choices, it will be chosen again and again.

How do environmental costs affect hydropower development?

Competition among energy choices must include consideration of their environmental impacts. The policy debate continues as to the best method for factoring environmental costs into the resource decisions of the electric market. For hydropower, those costs are generally already included in the purchase price. The cost of evaluating the potential environmental impacts of a project are paid by the project proponent in the development of its application and in the annual charges paid to the Commission during the license term. The cost to the environment itself is also included "up front" because environmental protection, mitigation and enhancement measures are generally "built into" the project. Fish ladders and screens ensure fish passage; minimum flows are established to preserve fishery habitat; wildlife management plans are approved and financed; cultural resource protection plans are implemented. The "external" costs of other energy technologies – air pollution, water pollution, waste disposal, global climate change, energy security implications – aren't present for a hydro site. The "up front" environmental costs paid by a hydro development make hydropower more expensive in the short run, but as the true costs of the alternatives are factored in, the long run benefits will be revealed.

Of course, just because these costs are factored in "up front" doesn't mean they shouldn't be scrutinized. The regulatory process should always ask what benefit is derived from added environmental measures. That is a particularly important question when one considers that when a hydro project is forced out of the electric marketplace by high environmental mitigation costs, it will be replaced by another energy technology, carrying its own environmental costs – some of which will be paid by future generations. It is important for decisions on environmental protection to be made in the larger context of national and global energy choices.

In addition to asking what proposed environmental measures will achieve, the process also needs to ask who gets the benefits and who pays. Electric consumers pay for the increased costs of power associated with environmental protection and mitigation measures. Because they are using the country's natural resources, it is fitting that they should pay the cost to protect those resources from damage. However, some environmental conditions have a much more limited purpose. License conditions designed to enhance the recreational experience of small groups of enthusiasts are paid for by those same electric consumers – rich and poor alike. Putting hydropower decisions in the larger context also means asking what hydropower dollars should subsidize – low rates for low income customers or whitewater rafting. The F.E.R.C.'s responsibility is to represent the interests of the public at large, but the process favors special-interest organizations (private and governmental) that participate in the regulatory process. Recreation facilities for the general public, for example, tend to be considered only after fish and wildlife measures, and are often sacrificed in their favor. Because S. 341 will help pull these issues back into a single decision-making process, it will make this kind of "big picture" analysis more likely.

Isn't the hydropower industry supporting the F.E.R.C. as a central decision-maker because F.E.R.C. is pro-development?

NHA's theme through much of its testimony has been the need to restore the F.E.R.C. as the central, and final, decision-maker for approval of hydropower projects. Some would charge that NHA takes this position because the F.E.R.C. is "pro-development" and therefore likely to approve more projects. NHA is an advocate for hydropower. We believe that it is an environmentally and operationally superior technology that has an important place in our resource mix. We believe that being "pro-hydro" is good energy policy. We would certainly prefer to be regulated by an agency that understands and acknowledges the unique values of this technology. We know that that agency must also protect the environment and give equal consideration to other water uses. We also know that agency personnel and "personality" change over time. Instead of picking an agency, NHA seeks a process that centralizes decision-making so that all factors – development and non-development – are given appropriate weight. For larger projects, we believe that can only be accomplished through a central federal agency. The F.E.R.C. is the best current candidate.

For small projects, it may be possible to achieve the comprehensive, centralized decision-making we believe is necessary at the state level. Some states have already developed comprehensive hydropower permitting systems; others have not. These differences, we believe, justify a voluntary jurisdictional cut-off. That does mean that project proponents will be able to "forum shop", just as they currently do under the existing exemption program. But there is no harm in allowing proponents to choose, as long as the states in which proposed projects are located will adequately protect the environment. If federal interests are affected – such as endangered species, national forest land, interstate rivers – federal agencies can be brought in under existing statutes.

This type of "forum shopping" is certainly to be preferred to the alternative advocated by American Rivers and National Wildlife Federation. At least when a forum is selected, it is likely to be a single forum with a comprehensive approach. Maintaining the existing fragmented approach allows agencies and special interests to keep choosing new forums until they get the outcome they want or until the project has "wasted away". As advocated by American Rivers, a project would have to go through multiple state and federal reviews (401 water quality certification, Section 4(e) conditions, rights-of-way pursuant to the Federal Land Policy and Management Act, state water rights proceedings, fishway prescriptions, F.E.R.C. licensing, etc.), with any one of them capable of vetoing the project. In addition, American Rivers' approach would use the federal authority of the F.E.R.C. to enforce all of these permits and conditions, even if the F.E.R.C. found them to be contrary to comprehensive development of the resource. Project opponents would continue to "forum shop" from agency to agency, subjecting the project to the "double jeopardy" of duplicate permits and conditions. This kind of double, triple or quadruple scrutiny just doesn't make sense for hydropower – a clean, safe, efficient, reliable, domestic, renewable resource.

Thank you for the opportunity to supplement the record with my views. The National Hydropower Association's staff and members remain ready to assist the Committee in any way.

SCHWABE
WILLIAMSON
& WYATT

ATTORNEYS AT LAW

2100 PENNSYLVANIA AVENUE, N.W., SUITE 670
WASHINGTON, D.C. 20037-3202
TELEPHONE: 202 785-5960 • FAX: 202 785-5966 • TELEX: 4937535 SWK UI

ALAN S. LARSEN

March 4, 1991

Senator J. Bennett Johnston, Chairman
Committee on Energy and Natural Resources
364 Dirksen SOB
Washington, D.C. 20510-6150

Re: Testimony on S. 341

Dear Chairman Johnston:

Enclosed for inclusion in the record of the February 26, 1991 hearing of the Senate Committee on Energy and Natural Resources on the hydropower provisions of S. 341 is the testimony of Gerald R. Garman on behalf of Seattle City Light and the Public Generating Pool. I am enclosing 10 copies of the testimony.

If the Committee conducts further hearings on the hydropower provisions of national energy policy legislation, especially on the issue of the federal role in hydro licensing and attempts to unravel the long-standing one-stop regulatory system which Congress has used from the initial passage of the Federal Power Act, my clients would very much appreciate the opportunity to address the Committee to describe from a practical, operational point of view the chaos that would result.

We appreciate the opportunity to present the Committee with the enclosed written testimony at this time.

Sincerely,

Alan S. Larsen

Alan S. Larsen

PORTLAND OREGON 503 222-9981 • SEATTLE WASHINGTON 206 621-9168 • VANCOUVER WASHINGTON 206 694-7551 • WASHINGTON DISTRICT OF COLUMBIA 202 785-5960

TESTIMONY OF GERALD R. GARMAN

ON BEHALF OF

SEATTLE CITY LIGHT

PUBLIC GENERATING POOL

Before the Senate Committee on Energy and Natural Resources

Hearing on Hydropower Subtitle of

National Energy Security Act of 1991, S.341

February 26, 1991

Mr. Chairman and Members of the Committee:

I am Gerald R. Garman, P.E., the Assistant Superintendent of Seattle City Light. I am submitting this testimony in support of section 4201 and generally in support of section 4202 of the National Energy Security Act of 1991, S.341. My testimony is on behalf of Seattle City Light and the Public Generating Pool (PGP). Seattle City Light is one of the largest municipal utilities in the country, with four hydroelectric projects licensed by the Federal Energy Regulatory Commission (FERC), having a total nameplate rating of 1,700 Mws. Seattle also purchases from five other hydroelectric projects. The Public Generating Pool is a group of eight publicly-owned generating utilities located in the states of Oregon and Washington. The PGP utilities own hydroelectric facilities licensed by FERC having a total nameplate rating of approximately 7,000 Mws. They directly serve nearly 600,000 retail accounts, and sell power to other utilities which serve millions of additional customers.

As the Committee knows, last year the United States Supreme Court decided the case of State of California v. Federal Energy Regulatory Commission, known as the "Rock Creek case". That case made no new law. It simply upheld fifty years of case law, reiterating that the Federal Power Act created a unified, one-stop shopping approach to licensing of hydroelectric projects. Congress has consistently taken the approach that all concerns and issues need to be brought to the same table in the licensing process, with a single decision-maker weighing them and deciding whether, and under what conditions, a license will be issued. Some of the states had wanted to unravel the unified approach that Congress has taken, arguing that existing law allowed for a piecemeal approach to licensing. They wanted to assert their own authority to overrule the FERC decision with regard to certain issues addressed in the course of reviewing a license application. Such a piecemeal approach to licensing issues would never work. Congress has always recognized this in the system it has mandated for licensing of hydropower projects, and the court so held.

Subsequently, there have been efforts to undo either directly or indirectly, the Rock Creek decision. There appear to be two main assumptions driving this effort. Neither are correct. The first notion is that environmental values will receive better treatment by the states than they will from FERC. The fact is that disjointed uncoordinated operation of the rivers will result in more environmental degradation than will be the case with coordinated operation. Further, environmental values must be explicitly considered by FERC in the licensing process.

The other notion seems to be that states must be permitted to protect themselves unilaterally because others will run roughshod over them during the licensing process. Again, exactly the opposite is true. If each state is free to ignore the impacts of its own actions on other states, the states will soon will find themselves on the receiving end of the unilateral self-interested actions of other states, not just on the giving end of their own actions.

Section 4201 of this bill directly addresses the issue of coordinated federal decision-making versus piecemeal state decisions in hydropower development and operation. The approach taken by Section 4201 ensures that FERC's actions will not be subject to a de facto veto by individual states, either directly or indirectly. While Seattle and the PGP support this approach, it is important to note that, as the Rock Creek decision confirms, this is already the state of the law. Failure to pass this legislation cannot be construed as leaving the door open to unilateral interference with the FERC licensing process through inconsistent state action.

The attempts to unravel the coordinated hydro licensing system in the wake of the Rock Creek decision are not just some theoretical debate about federalism or state's rights or bureaucratic prerogatives. The question is whether Congress is going to allow any disgruntled player, who does not get its way at the decision table with all other interested players, to get a second or third chance to get its way by obtaining a de facto veto power, either directly or indirectly. The two main proposals to date are a direct unraveling of the Federal Power Act, as proposed by Senator Craig, or a back door attack through somewhat more innocuous looking modifications to section 401 of the Clean Water Act, as proposed by Senator Jeffords. The operational impacts on the rivers are equally devastating under either approach.

The practical import of Sec. 4201 of this legislation is straightforward. The states want the absolute power to protect localized water-related interests such as fisheries. State agencies want to achieve this absolute power by imposing mandatory conditions such as minimum flow requirements at federally-licensed hydroelectric dams. Such state mandatory conditioning power would upset the present approach of balancing diverse interests which Congress has directed to be performed at the federal level. In many cases it would allow a state a _de facto_ veto over a project which FERC finds to be in the public interest. Section 4201 would prevent such a _de facto_ veto.

The present system of comprehensive federal regulation is absolutely necessary in the complex multi-state coordinated setting of the Pacific Northwest. Regulation of conditions such as minimum flow can have impacts far beyond an individual project and can affect projects and interests in other states and Canada.

From the very beginning point of hydropower regulation, Congress has chosen to vest final authority for determining the conditions of hydroelectric project licenses in the agency now known as the Federal Energy Regulatory Commission. Congress did not give the states veto power over license conditions which FERC has determined to be in the public interest.

Individual states are required by their own laws to administer their water resources for the benefit of their own citizens. Coordinated rivers systems could not operate with their present effectiveness if they were hampered by unilaterally-imposed license conditions designed to benefit the local interests of individual states.

Heretofore, Congress has never allowed the licensing process to be subjected to that kind of strain. Congress provided in the Federal Power Act a comprehensive regulatory scheme in which competing interests are balanced and accommodated under FERC's authority. When it recently amended the Federal Power Act in the Electric Consumers Protection Act of 1986, Congress provided an enlarged role for the states by institutionalizing the role of recommendations made by state regulatory agencies. However, it chose not to disturb the provisions of the Federal Power Act which preclude the states from having independent power to impose project license conditions based on regulatory laws.

Existing Federal law provides for meaningful state participation in decision about hydroelectric power. However, Congress has never allowed the final decisions about project licenses to be in the hands of the states. Rather, it has assigned to FERC both the responsibility to carry out federal policies and the ultimate authority which is necessary to meet that responsibility. That is the current state of the law, as affirmed in the Rock Creek decision by the Supreme Court, and Sec. 4201 of this legislation prevents any encroachment on that system of regulation.

The Pacific Northwest Hydroelectric System is a Complex and Coordinated System.

In the Pacific Northwest more than 100 hydroelectric projects are operated as a coordinated system. Some examples will illustrate the interrelated nature of the problems which must be addressed during the licensing process. These projects had to accommodate many competing interests through coordination under unified authority.

Wells Dam, licensed to Douglas County Public Utility District in 1962, is one of 11 dams located on the main stem of the Columbia River, some upstream, some downstream, some federal, some non-federal. The volume of the Columbia's flow in the Pacific Northwest states depends in part upon the operation of Canadian dams and reservoirs. The dam and reservoir abut federally-owned lands, tribal lands of the Colville Indian Reservation, and private lands under the jurisdiction of various municipalities and the State of Washington. All these dams and reservoirs are coordinated by hydroregulation under the existing Pacific Northwest Coordination Agreement.

The Wells license requires coordination with other facilities, with utilities in Washington, Montana and Oregon, and with the Corps of Engineers, the Bureau of Reclamation and the Bonneville Power Administration. Under the terms of the license FERC can, if necessary, order that coordination.

The license specifically requires fish passage facilities. The Washington Departments of Fisheries and Game, among others, participated before FERC in developing the details of that requirement. The license also recognized that the reservoir will encroach upon the tailwaters of the Chief Joseph Dam of the Army Corps of Engineers. It requires Douglas County Public Utility District to reimburse the Corps if that encroachment should interfere with power production at Chief Joseph.

The license addresses many competing interests. Those interests include power production, transmission arrangements, flood control and navigation under the jurisdiction of the Army Corps of Engineers, state and federal agency concerns regarding fish and wildlife, archaeological survey and salvage, recreation, and coordination of the project with the United States Columbia River power system.

The license also prescribes, for flood control, how the dam will be operated in conjunction with the federally-owned Dalles Dam downstream, as well as how the dam will use Canadian storage under the Columbia River Treaty (described below at pp. 19-20) for increased streamflow. It requires the licensee to provide power to the BPA federal system for delivery to Canada.

This coordinated consideration of diverse interests would not be possible with piecemeal regulation, or de facto vetoes by any party which did not get as much as it wanted in the licensing process.

The history of Priest Rapids Dam provides another example of the importance of FERC's authority. The license for Priest Rapids, issued in 1955 to the Grant County Public Utility District, provided for minimum flows of 36,000 cubic feet per second (cfs), which had to be coordinated with releases from upstream publicly-owned federal dams (Grand Coulee and Chief Joseph) as well as other upstream mid-Columbia dams such as Wells, Rocky Reach, Rock Island, and Wanapum. When it determined the minimum flows for Priest Rapids, FERC had to balance, along with all of the interests described in the discussion of the Wells license, the need to provide enough water for the cooling facilities at the Hanford nuclear projects at the Hanford Nuclear Reservation immediately downstream.

State fisheries agencies later petitioned FERC to amend the priest Rapids license to increase the minimum flows to 70,000 cfs. With the help of FERC Administrative Law Judges, Grant County Public Utility District and the state fisheries agencies reached several interim agreements to address state minimum flow demands while balancing other competing interests, and ultimately a long-term settlement agreement.

The parties involved in this settlement, approved by FERC and conducted under its auspices, included the Washington Departments of Fisheries and Wildlife, the National marine Fisheries Service, the Oregon Department of Fish and Wildlife, BPA, the Chelan, Douglas and Grant Public Utility Districts, and three sovereign Indian Tribes which have treaty fishing rights and are not, by and large, subject to state jurisdiction.

Since the early 1960's, the operation of most of the hydroelectric projects in the Pacific Northwest has been closely coordinated in a way that provides substantial benefits to the public in the Pacific Northwest states and in Canada. The parties to the Pacific Northwest Coordination Agreement include 15 public and investor-owned utilities that own and operate hydroelectric facilities as well as the Departments of Energy and Interior, the Army Corps of Engineers, and the Bureau of Reclamation. The Agreement provides for the coordinated operation of well over a hundred hydroelectric plants, including 21 projects owned and operated by the United States government. Many of these projects are on the Columbia River and its tributaries; the rest are located through the Pacific Northwest. Because the Bonneville Power Administration is a member of the coordinated system, any change in power projection at a single hydroelectric facility affects the price paid for electricity by every ratepayer in the Pacific Northwest and in much of California.

In the Pacific Northwest, unlike many other areas of the country, the benefits of a large portion of the annual runoff must be captured within a short time or be lost forever. Taking such constraints into account, the coordinated system achieves a delicate balance among utility load requirements, reservoir storage capacity, and streamflow needs.

Each year the coordinated planning process must choreograph, for all of the system's more than 100 projects, the system-side storage and release of water to provide for regional and international power needs while taking into account, for each project, such things as minimum flow requirements, upper storage limits for flood control and recreation, the need to set aside water for increased streamflows to aid in the downstream migration of fish, spills of water from individual dams to transport juvenile fish around the turbines, maximum outflows, tail water restrictions, and the specific operational constraints of each of the projects.

The result is a regional system which is coordinated electrically, hydraulically, contractually and economically.

Minimum flow requirements, which reduce the system's flexibility, can have a substantial impact on the ability of the system as a whole to optimize power production. Such requirements affect not only the individual project upon which they are imposed, but potentially every project and utility in the entire coordinated system. Those effects are felt across state and international boundaries. If Oregon, Washington, Idaho, Montana, and Wyoming could each impose minimum flow requirements based on legally-mandated local self-interest the result would be the disruption of the economic viability of projects hundreds of miles downstream. It could even include destruction of an ocean fishery.

The Federal Hydroelectric Regulatory System Is Operating as Congress Intended and Should Not Be Unravelled

The Federal Power Act is a comprehensive scheme of regulation which requires FERC to balance multiple interests, including those of the state and federal governments. Section 10(a) of the FPA requires that FERC consider not only hydropower but also other beneficial uses in its determination of the public interest.

In its licensing proceedings FERC not only considers a wide variety of issues, but considers these issues from the perspectives of many parties. The breadth of FERC's Congressionally-mandated concern with the public interest contracts markedly with the interests of individual states which necessarily are more localized and parochial. For example, the Water Resources Code of the State of

Washington provides:

> "It is the purpose of this chapter to set forth fundamentals of water resource policy for the state to ensure that waters of the state are protected and fully utilized for the greatest benefit to the people of the state of Washington." Wash. Rev. Code Sec. 90.54.010 (emphasis added)
>
> "Allocation of waters among potential uses and users shall be based generally on the securing of the maximum net benefits for the people of the state." Wash. (Rev. code Sec. 90.54.020(2) (emphasis added)

The Montana Water Use Code embodies that state's policy to

> "... provide for the wise utilization, development, and conservation of the waters of the state for the maximum benefit of its people ..." Mont. Code Ann. Sub 85-2-101(3) (emphasis added)

Similarly, Oregon's water resources policy is to be guided by a legislative finding that:

> "The maintenance of the present level of the economic and general welfare of the people of the state and development of this state for the increased economic and general welfare of the people thereof are in large part dependent upon a proper utilization and control of the water resources of this state ..." Or. Rev. Stat. Sec. 536.220(1) (emphasis added)

FERC properly takes the states' local interests seriously in its licensing proceedings. However, Congress has not chosen to allow local or parochial interests to be the basis for giving individual states a veto power over hydroelectric projects which FERC has determined are in the interest of all the public. Instead, Congress in the FPA created detailed provisions which "leave no room or need for conflicting state controls." 328 U.S. at 181.

Recent Congressional action evidenced a continuing intent that FERC, not the states, be responsible for and have final authority for performing the licensing function. The Electric Consumers Protection Act of 1986 ("ECPA"), Pub. L. No. 99-495 (October 16, 1986) added Section 10(j) to the Federal Power Act. That new provision requires that each license issued by FERC include conditions for protection and enhancement of fish and wildlife. 16 U.S.C. Sec. 803(j). Those conditions shall be based on recommendations of the National Marine Fisheries Service, the

United States Fish and Wildlife Service, and state fish and wildlife agencies unless FERC specifically finds that those recommendations are inconsistent with the governing law. 16 U.S.C. Sec. 803(j)(2). Thus, Congress, by adding that requirement to the Federal Power Act, continued to reject granting the states a "veto over a project," but rather chose to require "heavy reliance and acceptance by FERC, except in limited circumstances," of agency recommendations. H.R. Rep. No. 99-507, 99th Cong., 2d Sess. p. 22 (1986), reproduced at 198 U.S. Code Cong. and Adm. News 2496, 3509. Although Section 10(j) "upgrades statutorily the importance and status of fish and wildlife recommendations," they nevertheless remain "'recommendations,' not mandatory requirements." H.R. Rep. No. 99-934, 99th Cong., 2d Sess. p. 25 (1986), reproduced at 1986 U.S. Code Cong. and Adm. News 2537, 2541. Under new section 10(j), FERC remains empowered to decide license terms and conditions (id. p. 23, reproduced at p. 2540). Clean Water Act Sec. 401 Certification proceedings were never intended and should not now be employed to undermine that responsibility and authority.

Both before and after the enactment of ECPA, the states have participated in decisions about hydroelectric power by allocating priorities to water rights within their jurisdictions and by advancing and advocating localized interests in the FERC licensing process. The debate is not whether those interests will be protected. FERC is required to, and does, take them into account in the Congressionally-mandated balancing process. But the ultimate balance must be struck at the federal level, as provided in the FPA, without threat of additional conditions which a state might unilaterally impose based on purely local state interests.

Congress should not jettison its long-standing unified approach to licensing decision-making by permitting any backdoor attack on its existing one-stop decision system through enhancements, clarifications or other shenanigans in the name of Sec. 401 of the Clean Water Act, or through direct amendment to the Federal Power Act. Section 4201 of S.341 wisely precludes any such modification.

In addition to addressing the respective federal and state roles in the licensing process, S. 341, in Section 4202 (e), would strike the mandatory authority of NMFS and F&WS to prescribe "fishways" pursuant to Section 18 of the Federal Power Act. There is no statutory definition of "fishway", although FERC is in the process of defining the term administratively. "Fishways" has been defined very broadly in the past by the agencies which have the authority to prescribe such measures, National Marine Fisheries Service in the Department of Commerce, and the Fish and Wildlife Service in the Department of the Interior. These agencies will often have modifications and additions they would like to see at a project (wish lists), and no way to pay for them. They often attempt to force a project developer or operator to build and pay for the wish list items in order to get the agency to go along with the plan. If the item can't be "sold" on its merits as a non-binding proposal, and FERC declines to make it a condition of a license, the existing "Section 18 authority" to prescribe "fishways" has been used to demand the construction of a wish list item by calling the item a "fishway."

If Congress eliminates this problem as proposed in S. 341, the federal government will still be able to protect fish and related interests. Section 18 has become superfluous as a bona fide fish protection measure. FERC's authority under the Federal Power Act to condition licenses upon fish protection measures, and the dispute resolution requirements of Section 10j established by ECPA protect those interests. What would no longer be protected is the ability to play definition games and thereby mandate measures which would not be imposed on their merits.

American Rivers

March 12, 1991

Committee on Energy and Natural Resources
U.S. Senate
364 Dirksen Senate Office Building
Washington, D.C. 20510

To whom it may concern:

I would like the enclosed graph to be included in the record with the written testimony I presented at the February 26, 1991 hearing before the Committee on Energy and Natural Resources on the hydropower provisions of S. 341, the National Energy Security Act. The graph illustrates the number of hydropower licenses and exemptions issued each year by the Federal Energy Regulatory Commission from the year 1979 through 1990.

The enclosed graph is intended to help illustrate that the number of Commission licenses issued each year has been, in part, attributable to economic conditions affecting hydropower development during that year.

Thank you for your assistance in this matter.

Sincerely,

John D. Echeverria

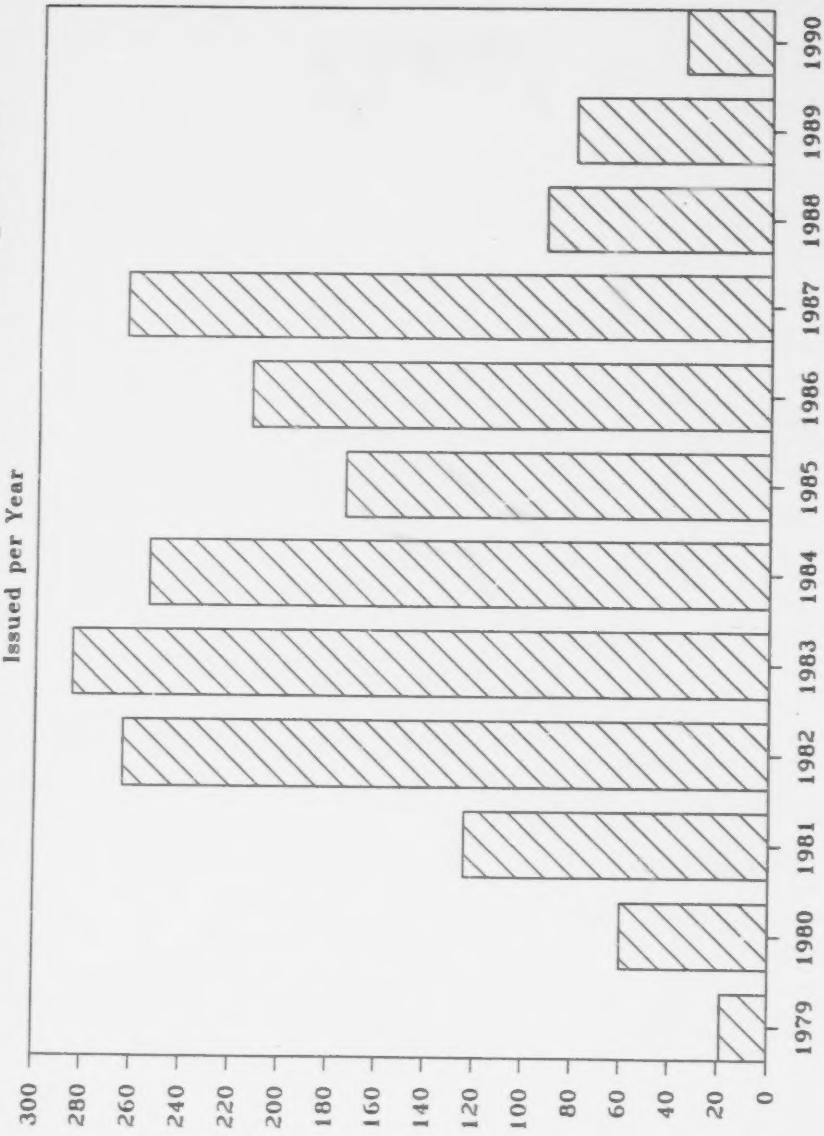
John D. Echeverria
Vice President and
Conservation Director

Enclosure

801 PENNSYLVANIA AVE., SE
SUITE 400
WASHINGTON, DC 20003
(202) 547-6900
(202) 543-6149 (FAX)

FERC Hydro Licenses and Exemptions

Issued per Year



Source: Federal Energy Regulatory Comm.

INTERSTATE COUNCIL
ICWP
ON WATER POLICY

955 L'Enfant Plaza, S.W., Sixth Floor
Washington, D.C. 20024
(202) 466-7287
Fax (202) 646-6210

EXECUTIVE DIRECTOR
James K. Coyne
MANAGER
Florence E. Mangano

CHAIRMAN
Randy Young
Executive Director
Arkansas Soil and Water
Conservation Commission
One Capitol Mall, Suite 2-D
Little Rock, AR 72201
(501) 682-1611 Fax (501) 682-3991

FIRST VICE CHAIRMAN
Wayne T. Haas
Administrator
Policy and Planning Division
Department of Water Resources
Statehouse
Boise, ID 83720
(208) 327-7910 Fax (208) 327-7866

SECOND VICE CHAIRMAN
John R. Wodraska
Executive Director
South Florida Water
Management District
P.O. Box 24680
West Palm Beach, FL 33416-4680
(407) 686-8800 Fax (407) 687-6436

SECRETARY-TREASURER
John McSparran
Director
Bureau of Water Resources
Management
Department of Environmental
Resources
P.O. Box 8761
Harrisburg, PA 17105-8761
(717) 787-6750 Fax (717) 657-4057

PAST CHAIRMAN
Jerry D. Vineyard
Director
Geological Survey Program
Missouri Department of
Natural Resources
P.O. Box 250
Rolla, MO 65401
(314) 364-1752 Fax (314) 364-7759

BOARD OF DIRECTORS
Gerald M. Hansler
Executive Director
Delaware River Basin
Commission
P.O. Box 7360
West Trenton, NJ 08628
(609) 883-9500 Fax (609) 883-9522

James U. McDaniel
Deputy Director
California Department of
Water Resources
1416 Ninth Street
Sacramento, CA 95814
(916) 445-3081 Fax (916) 322-5764

Peter G. Morros
Director
Department of Conservation
and Natural Resources
123 West Nye Lane
Carson City, NV 89710
(702) 687-4360 Fax (702) 687-4972

David L. Pope
Chief Engineer
Division of Water Resources
Kansas Board of Agriculture
109 S.W. 9th Street
Topeka, KS 66612-1283
(913) 296-3717 Fax (913) 296-2247

Herbert M. Sachs
Assistant Secretary
Department of Natural Resources
Tawes State Office Building
580 Taylor Avenue
Annapolis, MD 21401
(301) 974-3547 Fax (301) 974-5206

Mark F. Steichen
Director
South Dakota Department of
Natural Resources
523 East Capitol
Foss Building, Room 425
Pierre, SD 57501-3181
(605) 773-4216 Fax (605) 773-6035

Alfred H. Vang
Executive Director
South Carolina Water
Resources Commission
1201 Main Street, Suite 1100
Columbia, SC 29201
(803) 737-0800 Fax (803) 765-9080

March 11, 1991

The Honorable J. Bennett Johnston
Chairman, Energy and Natural Resources Committee
United States Senate
SD-364 Dirksen Senate Office Building
Washington, D.C. 20510-6150

Attn: Bill Conway

Dear Chairman Johnston:

The Interstate Council on Water Policy requests that the attached testimony on the National Energy Security Act of 1994 (S. 341) be included in the record of the hearing before the Senate Energy and Natural Resources Committee. We regret that we were unable to appear on February 26 before the Committee to offer our views on the hydropower provisions of this comprehensive legislation.

The Interstate Council on Water Policy (ICWP) is the independent national association of state, interstate and regional water administrators concerned with water quantity, quality, management, conservation and development. Since 1959, ICWP has been the voice for state water management concerns, particularly with regard to the relationship between state and federal programs and regulatory authority. As such, ICWP is deeply concerned about restoring balance between federal and state interests in hydropower development and protecting the States' fundamental sovereignty over their waters.

ICWP appreciates the opportunity to offer testimony on S. 341 and stands prepared to assist the committee in fashioning legislation that is responsive to state water management concerns.

Sincerely,

Holly Stoerker

Holly Stoerker, Chairman
ICWP Legislative Committee

INTERSTATE COUNCIL
ICWP
ON WATER POLICY

955 L'Enfant Plaza, S.W., Sixth Floor
Washington, D.C. 20024
(202) 466-7287
Fax (202) 646-6210

EXECUTIVE DIRECTOR
James K. Coyne
MANAGER
Ramona E. Mangone

CHAIRMAN
Ralph Young
Executive Director
Arkansas Soil and Water
Conservation Commission
One Capitol Mall, Suite 2D
Little Rock, AR 72201
[illegible] Fax [illegible]

FIRST VICE CHAIRMAN
Wayne T. Haas
Administrator
Policy and Planning Division
Department of Water Resources
Statehouse
Boise, ID 83720
[illegible] Fax [illegible]

SECOND VICE CHAIRMAN
[illegible]
Executive Director
South Florida Water
Management District
P.O. Box 24680
West Palm Beach, FL [illegible]
[illegible] Fax [illegible]

SECRETARY TREASURER
[illegible]
Director
Bureau of Water Resources
Management
Department of Environmental
Resources
P.O. Box [illegible]
Harrisburg, PA [illegible]
[illegible] Fax [illegible]

PAST CHAIRMAN
Jerry D. Vineyard
Director
Geological Survey Program
Missouri Department of
Natural Resources
P.O. Box 250
Rolla, MO 65401
[illegible] Fax [illegible]

BOARD OF DIRECTORS
Gerald M. Hansler
Executive Director
Delaware River Basin
Commission
P.O. Box 7360
West Trenton, NJ 08628
[illegible] Fax [illegible]

James U. McDaniel
Deputy Director
California Department of
Water Resources
1416 Ninth Street
Sacramento, CA 95814
[illegible] Fax [illegible]

[illegible]
Director
Department of Conservation
and Natural Resources
25 West Nye Lane
Carson City, NV [illegible]
[illegible] Fax [illegible]

David L. Pope
Chief Engineer
Division of Water Resources
Kansas Board of Agriculture
[illegible] Street
Topeka, KS 66612-1283
[illegible] Fax [illegible]

Herbert M. Sachs
Assistant Secretary
Department of Natural Resources
Tawes State Office Building
580 Taylor Avenue
Annapolis, MD 21401
[illegible] Fax [illegible]

[illegible]
Director
South Dakota Department of
Natural Resources
523 East Capitol
Foss Building, Room [illegible]
Pierre, SD [illegible]
[illegible] Fax [illegible]

Alfred H. Vang
Executive Director
South Carolina Water
Resources Commission
201 Main Street, Suite [illegible]
Columbia, SC [illegible]
[illegible] Fax [illegible]

Testimony of the
Interstate Council on Water Policy

Hearings on the
National Energy Security Act of 1991 (S. 341)

Senate Energy and Natural Resources Committee
February 26, 1991

The Interstate Council on Water Policy (ICWP) is deeply concerned about provisions of the proposed National Energy Security Act of 1991 (S. 341) that would severely impact the ability of the States to protect and manage our water resources. These provisions found in Title IV, Subtitle C-Hydropower would amend both the Clean Water Act and the Federal Power Act to expand the powers of the Federal Energy Regulatory Commission (FERC) in licensing hydropower projects. The Interstate Council on Water Policy believes the proposed amendments are unnecessary for the development of a viable national energy policy and detrimental to the ability of the States to ensure federally-licensed projects comply with state law.

State water resource administrators have had a long-standing concern about FERC's authority in hydropower licensing. It has never been clear why a federal energy development agency (FERC) is best positioned or qualified to have authority over hydropower projects which contribute minimally to national energy needs and can have significant effects on a wide variety of local resource management concerns such as recreation, fish and wildlife, water quality, and land use. FERC does not and cannot conduct comprehensive water planning activities. States, not FERC, have the primary responsibility for protecting and managing the water resources in the public interest.

With specific reference to the hydropower provisions of S. 341, the Interstate Council on Water Policy offers the following comments:

1) Section 4201 would prohibit the States from including as a condition of certification, under Section 401 of the Clean Water Act, any requirement not directly related to discharges resulting from the construction or operation of the hydropower project. Furthermore, the decision as to whether the state requirements violate this section would rest exclusively with FERC.

   Section 401 certification is currently the only regulatory foothold which many States have in the hydropower licensing process. Rather than narrowly defining this authority, the Interstate Council on Water Policy supports an approach such as that offered by Senator Jeffords last year (S. 3186) which would expand Section 401 of the Clean Water Act to stipulate that a "discharge" includes an activity that, while it might not introduce foreign objects (chemicals) into the waterway, might still result in water quality degradation or impairment of designated uses recognized under state law.

Regardless of how the limits of Section 401 certification are ultimately defined by the courts or by Congress, it seems clear that FERC is not the appropriate agency to judge whether or not State 401 certification requirements are legitimate. FERC's history of disregard for state water law and its lack of expertise in water quality suggest that they are not well-suited to making such determinations. States must retain the authority to ensure that federally-licensed hydropower projects comply with state law.

2) Section 4202 would eliminate the present authorities of the Secretaries of Interior and Agriculture to condition permits for projects on lands under their jurisdiction. FERC would only be required to consider recommendations from such federal agencies. This provision also appears to be an unnecessary consolidation of authority in FERC, which as previously noted is not particularly well-equipped to address the broad range of natural resource concerns involved in hydropower development.

3) Section 4202 would also exempt projects with power production capacities of 1500 kilowatts (1.5 megawatts) or less from provisions of the Federal Power Act. The Interstate Council on Water Policy believes there is great merit to this approach and would in fact suggest that consideration be given to raising the limit even higher than 1.5 megawatts. Nearly 80 percent of the total hydropower capacity in the nation is in plants over 100 megawatts. Clearly, small hydropower facilities contribute little to this country's total energy needs. Given the fact that thermal power plants which often exceed 1000 megawatt capacity are not within the jurisdiction of FERC, it is difficult to assert that hydropower projects, most having capacities of less than 100 megawatts, are of paramount importance to the development and implementation of a sound national energy policy and warrant setting aside state comprehensive plans and laws.

Exempting small hydropower facilities from federal licensing deserves serious consideration. In light of the fact that States are better qualified to balance competing uses and that FERC has frequently pre-empted state authority in its licensing decisions, some States have even suggested that a program of state assumption may provide a viable alternative.

Last year, 50 States joined together in opposition to the FERC decision in the California Rock Creek case. The U.S. Supreme Court upheld the FERC decision, ruling that a State does not have the right to regulate the flow of water at dams within its borders. However, the Court noted that it was obliged to bind itself to "longstanding and well-entrenched decisions," arguing that it is better that a rule of law be settled than it be settled correctly. The Supreme Court clearly invited Congress to clarify its intent regarding States' authority. The Interstate Council on

Water Policy (ICWP) urges Congress to accept the invitation from the court. Amendments to the Clean Water Act and the Federal Power Act are needed to clarify and reinstate the right of States to manage and protect their water resources in the public interest. However, ICWP does not believe that the amendments offered in S. 341 meet that need. In fact, with regard to the issue of Section 401 certification, this legislation would further frustrate the States' ability to manage their water resources comprehensively. In contrast, ICWP supports legislation sponsored last year by Senator Jeffords (S. 3186) which would amend the Clean Water Act to expand and protect the States' right to ensure projects comply with state law through the condition of certification under Section 401. Furthermore, ICWP supports bills introduced this year by Senator Craig (S. 106) and Rep. Stallings (H.R. 649) which would provide states the right to control the use of water within their jurisdiction.

Recent actions by FERC in issuing a license to a private entity to develop a hydroelectric project at the Nockamixon State Park Dam in Pennsylvania underscore the need to further amend the Federal Power Act. The FERC position is that the Federal Power Act preempts all state authority, including the state's proprietary interest in a State Park. The right of the State of Pennsylvania to provide for its citizens a major recreation facility and operate a facility as part of the Delaware River Basin Commission's drought management plan is being preempted by FERC under the guise of national interest in energy development. The Federal Power Act should be amended to exempt state owned or controlled lands from the right of the licensee to exercise the power of eminent domain.

In conclusion, the Interstate Council on Water Policy supports Section 4202(f) but opposes Sections 4201 and 4202(a-e) of the proposed National Energy Security Act of 1991. While ICWP concurs with the need to amend both the Clean Water Act and the Federal Power Act, we suggest that the type of amendments proposed last year by Senator Jeffords and those offered this year by members of the Idaho delegation be considered for inclusion in S. 341. In addition, the amendment discussed above to address the state issue raised by Pennsylvania should also be included. The Interstate Council on Water Policy stands ready to assist in this most important endeavor.

WESTERN STATES WATER COUNCIL

Creekview Plaza, Suite A-201/942 East 7145 South/Midvale, Utah 84047/(801) 561-5300 / FAX (801) 255-9642

March 11, 1991

The Honorable J. Bennett Johnston, Chairman
Senate Committee on Energy and Natural Resources
Dirksen Senate Office Building, Room 364
Washington, D.C. 20510

Dear Chairman Johnston,

Concerning the Committee's February 26th hearing, on behalf of the Western States Water Council, I would like to respectfully submit for the record the following testimony with regard to the National Energy Security Act of 1991, specifically Title IV, Subtitle C - Hydropower.

We sincerely appreciate your efforts to address national energy policy, and simplify what is a very complex and sometimes unnecessarily cumbersome federal hydropower licensing process. The Council has in the past testified regarding state interests in this process and made suggestions for accomodating state concerns and establishing a reasonable balance with federal interests in the development and management of water for power purposes.

Western states recognize the importance of hydroelectric power, which fulfills a substantial portion of our regional energy needs. Indeed, water and power have been particularly important in the development of the region, and have been happily and successfully married in many projects under both state and federal law. This special relationship has matured over many decades and brought growth, prosperity and an enviable quality of life.

At present, many western states face a serious drought, which reminds us how precious our limited water resources are for innumerable uses. For the past five years, the resiliency of our regional water infrastructure, built with state and federal help, has postponed many of the hard choices that we now face. Until the rains and snow return, state and federal water managers will weather this threat together. We hope that this same spirit of cooperation can be designed into the federal hydropower licensing process.

Efforts to divorce state water law and management from federal energy law and policies threaten the effective cooperative management of our limited water and hydropower resources and can not succeed. Any changes in federal energy law and policy must necessarily consider the impact on western state water management.

Again, western states recognize hydropower development as a beneficial use of water under state law. In order to maximize both public and private benefits from the use of our water resources for all purposes, hydropower projects must unavoidably be subject to some level of state regulation. For more than a hundred years, western states have regulated water for all uses, including hydropower projects, under a system of water rights that has fostered fairness, certainty, and prosperity. Working within state laws, the Congress has authorized and federal agencies have constructed a massive federal water and power system. Moreover, until the last decade, federal licensing of non-federal hydropower development has generally proceeded in harmony with state water law and without serious conflict.

When the Federal Power Act was enacted, the Congress clearly recognized the importance of a cooperative state and federal regulatory program and through Section 27 clearly reserved to the states and state law, "...the control, appropriation, use or distribution of water used in irrigation or for municipal or for other uses, or any vested rights acquired therein." Moreover, through Section 9, the Act directed that any applicant for a federal license must comply "...with the requirements of the laws of the state or states within which the proposed project is to be located with respect to...the appropriation, diversion, and use of water for power purposes...."

Over the years, narrow judicial decisions have muddied the Congress' clear intent regarding the appropriate relationship between federally licensed hydropower development and state water law, water rights administration and water resources planning and management. Last year, the U.S. Supreme Court carefully avoided the legislative history of the Federal Power Act in reaching its California v. Federal Energy Regulatory Commission decision and upheld an earlier ruling. Forty-nine states signed an amicus brief supporting California's contention that the Congress intended to defer to the states on water use issues. Still, the Court said it was better to have the matter settled, than settled right. The Court appropriately noted that the Congress was free to undo what it had done.

The Western States Water Council has previously urged the Congress to accept this invitation and restore essential balance to the federal hydropower licensing process by again explicitly recognizing by statute the necessary state role. The Council and the Western Governors' Association support amendments to the Federal Power Act to reaffirm the Congress' intent that the states retain their traditional authority over all water uses with their boundaries, including hydropower.

Moreover, we are discussing appropriate ways to strengthen the states' role, perhaps through Section 401 of the Clean Water Act. Non-federal hydropower development must be subject to valid existing proprietary water rights and reasonable state permit conditions that are designed to balance all water uses and protect water quality and the environment.

States are in the best position to administer water rights and regulate and protect all uses, including hydropower. The Federal Energy Regulatory Commission (FERC) should support and supplement the states' abilities. Rarely, when there is a clear overriding federal interest, might state decisions be preempted. However, FERC does not have the ability, the experience, or the resources to usurp the states' role. FERC's assertion of exclusive authority over water use by federally licensed hydropower projects, without regard to state law and regulations related to the appropriation and use of water for all purposes, is unreasonable and unworkable.

The existing legal and institutional system can be successfully improved for the benefit of all those involved, but not by granting FERC dictatorial powers. Legitimate state and federal and other interests in the proper development and regulation of our water and power resources can and must be balanced within a cooperative system. Removing remaining checks on FERC's authority concentrates power in an agency which has yet to demonstrate the ability and wisdom to balance all competing water uses. Given western states' experience, unlike Solomon, FERC will divide the baby, to no one's benefit! State water law and management and federal hydropower policy must remain integrated for the licensing process to be workable.

We would urge the Committee and the Congress to carefully and thoughtfully consider and enact amendments to federal law that will reaffirm and reasonably balance state and federal interests to help achieve the optimal development and protection of our natural resources. This can not be accomplished without preserving existing state authorities. A through review of the federal hydropower licensing process is needed. Given the current state of the law, many important questions remain unanswered.

What is the national interest in small non-federal hydropower development? What criteria does or should FERC use to justify premption of state and local decisions? The national interest is an amalgation of many varied and sometimes conflicting interests. It can not be unilaterally defined by any single government agency. FERC can not effectively make what are appropriately state and local water use decisions. Moreover, simply publicizing FERC orders in the Federal Register, belatedly soliciting state comments, and then denying as untimely state requests for rehearing is not acceptable. This has been western states' experience with FERC with respect to orders defining state comprehensive plans and the waiver of state water quality certification requirements under the Clean Water Act.

What is the nature of a comprehensive plan for development of a waterway, as mentioned in the Federal Power Act, and how can a project best be integrated with such a plan or plans? FERC has in the past testified before this and other committees that it has not prepared a single comprehensive plan. Indeed, FERC has no authority "...to 'plan' a waterway in the sense of issuing a 'plan' that determines what all the various uses of the waterway should be. Rather, ...the Commission analyzes proposed licensed projects in light of the entire record in the proceedings, as developed by the applicant, the Commission staff, intervenors, commenting state and federal agencies, and others."[1]

States do have authority and do plan for and regulate all the various uses of a waterway (except for navigation). Every western state has some type of a state water plan (or planning process). The Electric Consumers Protection Act recognized the importance of such plans in balancing hydropower development with other uses of a waterway and environmental protection. Therefore, state decisions and requests for conditions on a federal hydropower license should be given great weight, if not deference, in FERC's proceedings. Ironically, FERC has preempted many state and local decisions on the basis of FERC's Section 10 comprehensive planning authority (or lack thereof). No project should be licensed by FERC that can not be certified by the state as consistent with state plans for protecting water quality, or for allocating quantities of water among different uses, without clear and convincing evidence of an overriding federal interest in that project.

How and when should non-federal hydropower development be subordinate to other uses of a waterway? Changing public and private values and uses of a waterway will inevitably create future conflicts between hydropower and other uses, as well as over state and federal regulation and jurisdiction. FERC has no authority to "plan" for future uses, and to date, has refused state requests to condition licenses to subordinate hydropower to future uses (as sometimes required under state law), even where such uses were reasonable and foreseeable. Rather, FERC reserves the authority to amend a license at some future time, if it then determines another use would be in the public interest.

What does this mean? Does it mean every new diversion of water upstream of a federally licensed project will require FERC's approval and amendment of every downstream license? What if a farmer adds 50 acres of potatoes to his irrigated operation? Is FERC's approval required? What if he changes his current cropping pattern from a lesser to greater and more intensive use of water? Can FERC require a permit? What about municipal water supply wells? What about domestic water use, which under state law may not require a permit or even notice? Should FERC regulate these uses? No! Could FERC regulate these uses? No!

---

[1] Hearing on the Nomination of Martha O. Hesse to be a Commissioner of the Federal Energy Regulatory Commission, before the Committee on Energy and Natural Resources, United States Senate, July 9, 1987, S. Hrg. 100-138, p. 138.

Western states can and do regulate such uses. State law also provides for the protection for such uses, which includes hydropower. If federally licensed projects are excluded from this comprehensive system of state regulation, everyone will suffer, including small hydropower developers. Granting a federal license for a project that has not and perhaps can not qualify for a state water use permit creates an undefined right to the use of water for power purposes that is unprotected by state law and which can not be protected by FERC. Most hydropower developers have recognized the wisdom in seeking a state water right protected by state law. Without a state water right, a licensee's only legal protection against subsequent conflicting uses would be through the federal courts, a time consuming and expensive process.

These questions represent only a few of the many unresolved issues complicating federal hydropower licensing that are not addressed by efforts to streamline the current process. Indeed, they can not be addressed unilaterally at the federal level. Finding answers and solutions will require the cooperation of state and federal interests, permittees and licensees, and others. A comprehensive review of current FERC hydropower licensing procedures and how to best accomodate, protect and balance all related rights and interests is necessary if streamlining the process is to be effective. Exempting from federal regulation non-federal projects of a certain size may be a partial answer. Other alternatives also need to be considered, if an enduring and workable solution is to be found.

Mr. Chairman, we applaud you for your efforts to begin the necessary dialogue. This hearing is a good start. We would hope to have the opportunity to actively participate in further hearings designed to forge a more cooperative state and federal working relationship relative to hydropower licensing. Based on the strengths of both state and federal law and regulatory systems, we can maximize the beneficial use of our water and power resources and meet the needs of our people, while protecting our quality of life and the environment.

Sincerely,

D. Craig Bell
Executive Director

enclosures

cc Senator Malcolm Wallop

POSITION
for the
WESTERN STATES WATER COUNCIL
Regarding
Federal Energy Regulatory Commission Order No. 464
Waiving State Water Quality Certification Requirements
April 14, 1989

WHEREAS, FERC Order No. 464 unilaterally and retroactively redefined the period of time within which states must grant or deny water quality certification under Section 401 of the Clean Water Act; and

WHEREAS, FERC provided the states with no notice regarding the retroactive application of Order No. 464 until after the period for timely requests for reconsideration had expired -- then rejected as untimely requests for reconsideration from the State of Alaska, California, and Washington, as well as other state petitions; and

WHEREAS, the Western States Water Council has repeatedly asked the Commission to reconsider this issue, to no avail; and

WHEREAS, the House and Senate respectively approved S. 1792 and H.R. 2020, which in part addressed this problem, but adjourned before being able to reconcile differences in the bills; and

WHEREAS, the Federal Energy Regulatory Commission, despite continuing calls from congressional and state leaders, recently determined no further action was warranted; and

WHEREAS, federal licenses remain pending for a majority of the projects for which FERC waived state water quality certification requirements; and

WHEREAS, the water quality impacts of these projects are of significant concern to many states; and

WHEREAS, the controversy over Order No. 464 continues to hinder improvements in relations between the Federal Energy Regulatory Commission and the states;

NOW THEREFORE BE IT RESOLVED that the Western States Water Council urge Congress to quickly consider and enact legislation to:

(1) return to the states general authority to grant, deny, or condition water quality certification for all projects where Order No. 464 waived such authority, but which have yet to be licensed by the Federal Energy Regulatory Commission;

(2) where projects have since received a federal license, require the Commission to explain the manner in which state water quality comments were solicited prior to the licensing of each project and the extent to which state recommendations were followed; and

(3) require the Commission, through the states, to document and record the date on which a project applicant files a complete application for state water quality certification; and

(4) clearly define the one-year period within which states must act on water quality certification requests as applying only to a states' initial decision to grant or deny certification, with or without conditions, and that the certification requirement cannot be waived due to an applicant's appeal of the state's initial decision.

POLICY STATEMENT
# of the
WESTERN STATES WATER COUNCIL
concerning
AMENDMENT OF THE FEDERAL POWER ACT
Bismarck, North Dakota
July 13, 1990

WHEREAS, water is scarce in the western states and the states have taken extraordinary steps to protect this critical natural resource; and

WHEREAS, each of the member states has tailored its regulation of water to the unique physiographic, hydrologic, and climatic conditions found within that state; and

WHEREAS, Congress has consistently deferred to state regulation of water because of the need for a unitary system of regulation; and

WHEREAS, water allocation decisions directly affect a state's environment and its economic development; and

WHEREAS, water flow regimes associated with hydropower development have a profound impact on a state's ability to fairly allocate its limited water resources among many competing beneficial uses; and

WHEREAS, states have conditioned hydropower water rights in order to balance the benefits of hydropower against the other beneficial uses that may be made of the water; and

WHEREAS, the Federal Energy Regulatory Commission (FERC) limits its review of a project to the record before it and does not perform a comprehensive review of existing and future uses of water resources within a river basin when issuing a project license; and

WHEREAS, only the member states have sufficient records of water rights, water resource records, and development data to fairly balance the use of its limited water resources; and

WHEREAS, FERC does not have the ability, experience or resources to regulate hydropower water rights in a manner that will maintain the balance that each state has struck between the various uses of water; and

WHEREAS, Congress envisioned that state water law would govern water uses associated with hydropower development, but in First Iowa Hydro-Electric Cooperative v. FPC the United States Supreme Court unnecessarily stated its belief that the Federal Power Act preempted state regulation of water use for hydropower projects, while addressing a licensing requirement unrelated to the issue of state authority; and

WHEREAS, in California v. FERC the Court recently upheld the decision in First Iowa on the principles of stare decisis while admitting that in a case of first impression there would be substantial reason to hold that Congress did not intend to preempt state regulation of hydropower water rights when enacting the Federal Power Act.

NOW THEREFORE BE IT RESOLVED that the Western States Water Council supports amendment of the Federal Power Act, such as S. 2805 and H.R. 5914, to assure that applicants for hydropower licenses comply with state substantive and procedural water law, thus restoring to the Act Congress' intent that state law govern water use associated with a hydropower project.

STATEMENT OF THE AMERICAN PAPER INSTITUTE
TO THE SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
ON S. 341
THE NATIONAL ENERGY SECURITY ACT

Title IV
Hydroelectric Licensing

Plus Additional Comments on

Title X, Section 10003, NEPA Compliance

and

Title III, Section 3007, Energy Efficiency Information
and Section 3201, Encouragement of Investments in
Conservation and Energy Efficiency Resources

February 26, 1991

TITLE IV

HYDROELECTRIC LICENSING REFORM

The American Paper Institute appreciates the opportunity to submit its views to the Senate Committee on Energy and Natural Resources on Titles III, IV and X of S. 341 and on the Administration's National Energy Strategy, S. 570.

The American Paper Institute ("API") is the national trade association of the pulp, paper and paperboard industry whose 175 member companies produce over 90% of the Nation's pulp, paper and paperboard. Companies in the paper industry comprise the largest class of non-utility owners of hydroelectric projects, producing 3.7 billion kwh of electricity in 1989. In addition, paper companies are major industrial purchasers of electricity, with an annual electric bill of over $2 billion. Consequently, API is in the unique position of representing not only industrial consumer interests but the interests of landowners and private hydroelectric developers as well.

As project owners and developers, paper companies have an interest in streamlining the hydroelectric licensing process, eliminating costly delay and duplication, and ensuring as consistent a national program as possible.

As landowners and downstream mill owners, API's members have a direct interest in ensuring that hydroelectric projects constructed on or near their lands do not adversely affect their woodland management operations. Furthermore, water quality is of major concern because poor quality water can hinder manufacturing operations and a mill's own water quality treatment requirements.

And finally, as electric consumers, API's members have a direct interest in a low cost, reliable supply of electricity. Prudent development of the Nation's hydroelectric potential will help achieve these goals.

In the past few years, FERC's authority to license projects has been eroded by the reinterpretation and innovative use of federal and state statutory authority. While the paper industry believes that "one-stop shopping" should be reestablished to provide for more rational development of the Nation's water resources, the paper industry also believes that hydro development must be weighed against other competing uses of those water resources. The paper industry believes that the measures proposed in S. 341 and S. 570 are, for the most part, sensible steps to streamline the regulatory process for hydroelectric development while acknowledging the need to manage the Nation's other natural resources.

The paper industry supports the passage of Section 611 of the Administration's bill which would add a new subsection (j) to FPA Section 4, which currently contains FERC's general licensing authority. FPA Section 4 subsection

(j) would clearly delineate FERC's overriding authority over the terms and conditions of licenses. However, specific licensing requirements that FERC must meet are contained in FPA Section 10. Consequently, API also supports the inclusion of the more specific provisions of S. 341 that reestablish FERC's paramount authority to ensure that FERC and the courts have a clear understanding of what Congress intends with this legislation.

The paper industry supports the passage of Section 4202, which would specifically amend FPA Section 4(e) and 10(a) to eliminate the ability of federal agencies to include mandatory federal land protection conditions in a FERC license. API believes that other provisions in Section 4202 to amend FPA Sections 4(e) and 10(i) to require that FERC make a finding that a project would not interfere with the purpose of the federal lands, and to require FERC to solicit and consider the recommendations of the agency having jurisdiction over the federal lands, would ensure thorough consideration of non-power issues.

The paper industry believes that S. 341's Section 4202 and the Administration's Section 611 strike a reasonable balance between the need for a "one-stop licensing" process and the needs of the federal land agencies to have control over the development of the resources under their jurisdiction. In API's view, the larger problem is the uncertainty created by having multiple federal vetoes over a hydro project. These legislative changes would concentrate federal authority in one agency without allowing the disregard of competing uses of the federal lands.

API supports the passage of S. 341's Section 4201, which would prohibit any state agency having the authority to issue a water quality certificate under Section 401 of the Federal Water Pollution Control Act ("Clean Water Act") from including conditions in the certificate that do not directly address compliance with discharge requirements under the Clean Water Act.

The paper industry believes that this provision squarely addresses a recurring problem in hydroelectric licensing. Despite several state court decisions which prohibit state agencies from including conditions (such as recreational requirements) that are unrelated to water quality requirements, many states continue to use their 401 water quality certificate authority as a means to circumvent FERC's authority. The paper industry supports this provision as a reasonable means of reaffirming the scope of the states' authority under CWA Section 401.

The paper industry also supports S. 570's Section 612 and S. 341's Section 4202(f) with some modification. Section 4202(f) would amend FPA Section 23 to exempt from FPA coverage projects having a power production capacity of 1,500 kilowatts or less. Section 612 would exempt unlicensed projects of five megawatts or less and would allow licensees of projects under five megawatts that are currently licensed to surrender their licenses. API has two reservations about both proposals.

First, although the paper industry prefers the Administration's proposal to exempt projects of five megawatts or less and to allow the surrender of licenses for such projects, it believes that this proposal, as well as that contained in S. 341, needs some modification. API believes that exclusion of small projects from FERC jurisdiction may be a double-edged sword. While freeing the developers of small projects from the FERC licensing process, it opens the door to state regulation and regulation by other federal agencies if the project would be located on federal lands. In the interest of developing domestic sources of energy, API believes that neither the Administration's bill nor S. 341 should be read as limiting FERC's jurisdiction to license projects if a license applicant voluntarily submits to FERC's jurisdiction. The paper industry suggests that S. 570's Section 612 could be amended to read "(i)(1) A constructed or proposed hydropower project with an installed capacity of five megawatts or less that has not received a license under this part by the effective date of the National Energy Strategy Act shall not be subject to FERC's jurisdiction unless the owner of the project voluntarily submits to FERC's jurisdiction." API's modification would allow a project owner to obtain a license, but not a third party having no ownership interest in the project.

Second, API also is concerned about the breadth of Section 4202(d). This provision would delete FPA Section 10(i), which gives FERC the authority to waive certain requirements of the FPA for small projects. However, FPA Section 10(i) currently also covers minor amendments to existing projects. API questions whether the framers intended to exclude from FERC jurisdiction amendments to licensed projects. As a practical matter, such an exclusion could create more confusion than clarity. API suggests that FERC should retain its authority under current law over amendments to licenses.

The paper industry supports the passage of Section 4202(e), which would amend FPA Section 18 to eliminate the authority of the Secretaries of Commerce and Interior to require that a licensee install "fishways" at hydro projects. Although the Administration's addition of a FPA Section 4(j) appears to address the same issue, API believes that the specific amendment of FPA Section 18 is needed to ensure no confusion or grounds for judicial review. The paper industry believes that the Administration's FPA Section 4(j) and Section 4202(e), combined with FPA Section 10(j), would provide much needed streamlining in the licensing process while providing thorough consideration of other natural resource values.

API does not support the Administration bill's Section 611 proposal to add a new FPA Section 4(h) for two reasons. First, this provision could complicate, rather than streamline, the pre-license application process. Although the proposal would establish a plan of the types of studies necessary for the licensing process, the ability of FERC to modify the study requirements of a particular plan "after determining that the public interest would be affected" could easily render the study plan meaningless.

Second, API objects to the language in this provision that would deprive a license applicant of the ability to appeal FERC approval and modification of a study plan. API believes that a license applicant's full right to due process is crucial at this stage of the licensing process because decisions made at the pre-application stage often determine the outcome of the proceeding and, consequently, the design and operation of a project. The FERC staff currently has total discretion at the pre-application stage with respect to the type of studies required of an applicant. API believes that this practice should be discontinued because a bad decision on the part of the Staff is never reviewed by the full Commission in a timely manner.

The Administration's bill would codify this unfortunate practice into law.

TITLE X

SECTION 10003. NEPA COMPLIANCE

The paper industry also supports Title X Section 10003 of S. 341, which addresses FERC's compliance with the National Environmental Policy Act ("NEPA") for gas pipelines, as well as hydroelectric projects. API believes that Title X Section 10003 is superior to the S. 570 Section 611 proposal to add a new FPA Section 4(i) because S. 341 Section 10003 contains more specific remedies to problems in FERC's NEPA processes, as well as addresses gas pipeline certification issues.

S. 341 Section 10003(a) clarifies that FERC would be the lead agency for NEPA compliance and allows FERC to establish reasonable time limits for consultation with other federal agencies. Section 10003 also permits FERC to allow third party contracting for the preparation of environmental assessments or environmental impact statements as part of its NEPA compliance process.

These provisions could shorten the licensing and pipeline certificating processes because FERC presently does not devote adequate resources to the timely preparation of environmental assessments and environmental impact statements.

Consequently, at least with respect to hydro licensing, decisions are sometimes delayed until the environmental documents necessary for the decision are prepared. API wishes to point out that at least two other agencies, the Interstate Commerce Commission and the U.S. Forest Service, use third-party contracting for NEPA documents. Third-party contracting by agencies is provided for in the Council on Environmental Quality's regulations governing NEPA.

API does have one concern regarding Section 10003. There have been informal suggestions put forth by the FERC staff that the use of third-party contractors might limit the ability of license applicants to have some role in the development of proposed mitigation for a project. The NEPA process should be used solely to gather information regarding a project and to weigh that information. The paper industry strongly opposes any attempt by FERC to use the NEPA process as a means of eliminating the ability of the license applicant to have substantive input on the mitigation issue.

TITLE III

SECTION 3007 - ENERGY EFFICIENCY INFORMATION

The paper industry seriously questions the usefulness of the scope of energy data sought in Section 3007. Our experience through the years with many energy reporting forms has been that while much information has been requested and provided, very little information has been utilized in any manner for a considerable period of time, at which point much of its usefulness is lost.

Samples of information end up being far more comprehensive than originally stated, short forms become long forms, and government bureaucracies are created and expanded with their value and usefulness never questioned. For example, the Manufacturers Energy Consumption Survey ("MECS") was begun in 1985 as a sample of manufacturers' energy use. Practically every mill in the pulp and paper industry was sampled. The first analysis of this data was not released until late 1988.

The paper industry recognizes the need for a better understanding of how energy is used in this country. For nearly twenty years, we have cooperated with many energy studies and investigations performed by a whole host of federal laboratories, government consultants, the Congressional Office of Technology Assessment, the National Academy of Sciences, as well as the Department of Energy. Most recently we participated in a workshop with the Energy Information Administration intended to permit government to better understand manufacturers' use of energy. Yet, in the laudable pursuit of increasingly accurate data, the urge to seek just one more bit of information, to create one more form to send to more and more recipients, has not translated into the availability and usefulness of the desired data in a reasonable period of time. Each of the returned forms must be verified, letters and telephone calls made to clear up errors, and those who participated by reporting their data become frustrated when more and more time passes and no analysis is issued. For example, EIA Form 867, issued in January 1989 for information on the extent of non-utility generation of electricity, has yet to produce any data but a new form has been issued for 1990 information.

The paper industry respectfully urges that the Office of Management and Budget or the Department of Energy itself review the need to continue the use of the multiplicity of existing studies, reports and reporting forms before embarking on the new round of mandatory reporting called for in S. 341.

The paper industry further urges that trade associations or other groups be allowed to collect and assemble the data from their industry groups in lieu of direct reporting by individual firms or mills themselves. This would assure the confidentiality of mill-specific data, a great concern to many industries, especially the pulp and paper industry. It would also ensure that those most familiar with the industry are the ones reviewing initial data response forms for accuracy, discrepancies, or unusual trends -- saving the government not just a significant expense but much time as well. API was permitted to collect energy information from the pulp and paper industry in the earlier mandatory energy reporting system, discontinued in the mid 1980s.

In the past, API sent our compilation of data for the entire industry to the DOE, along with significant analysis by the first quarter of the following year, which appeared to satisfy DOE at that time. Yet, when MECS was developed, and now EIA Form 867, our request to perform the same function was denied with virtually no explanation.

Today, as the government again claims the need for timely energy data, and the government more than ever seeks to curb waste and needless expense, the paper industry seriously urges that API be allowed to assemble the energy data sought from the pulp and paper industry.

The federal government should make use of private entities interested in assisting in the public reporting of energy information to ensure that it is effective, efficient and timely. Trade associations, such as the American Paper Institute, know a considerable amount about the quantities and form of energy information available from and pertinent to their respective industries. Failure to utilize the capability of those volunteering to assist in a reasonable energy reporting program would constitute a waste of resources.

SECTION 3201 - ENCOURAGEMENT OF INVESTMENTS IN CONSERVATION

The paper industry is in general agreement with cost-effective measures to reduce electricity consumption througout the nation. API would caution, however, that demand-side measures must be demonstrated to produce actual, permanent reductions in load, and to cost ratepayers no more than alternative supply-side measures. Moreover, the bill's suggestion that utility rates include returns on demand-side investments must ensure that such rates match the period of the return to the useful lives of those investments; utilities must not be permitted to continue to earn returns on obsolete equipment that is no longer performing its intended function.

APPENDIXES TO FEBRUARY 28 AND MARCH 20, 1991 HEARINGS

(Subtitle A of Title XI)

Appendix I—Responses to Additional Questions (Feb. 28)

U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**

The Administrator

400 Seventh St., S.W.
Washington, D.C. 20590

MAR 27 1991

The Honorable J. Bennett Johnston
Chairman, Committee on Energy and
Natural Resources
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

Thank you for your letter transmitting additional questions from your Committee for inclusion in the record of the hearing of February 28, 1991. I appreciated the opportunity to participate in the hearing.

As I stated at the hearing, the relationship between fuel economy and safety is a matter of great concern to our agency. I welcome the chance to answer your further questions on that subject. My answers to your questions are enclosed.

Sincerely,

Jerry Ralph Curry

Enclosures

QUESTIONS FROM SENATOR JOHNSTON

Question 1a: Some experts argue that the safety of a car is not simply a function of weight, but a function of weight, length, materials, and design. Do you agree or disagree?

Answer

Weight, length, width, materials, design, and safety equipment can all be important safety factors, depending on the type of crash.

Question 1b: What is the relative importance of these four factors in determining safety?

Answer

The relative importance of those factors depends on the type of crash and is not exactly known, however -

- Given that all new cars must meet NHTSA safety standards, car weight is by far the most important factor in explaining differences in collision performance between two cars, especially in head-on collisions. The heavy car is much safer than the lighter car in the crash.
- Longer, wider cars have lower risk of rollover and some other types of crashes involving loss of control. In general, making cars longer and wider adds weight.

QUESTIONS FROM SENATOR JOHNSTON

Question 1c: Have studies of auto safety adequately controlled for the influence of all four factors?

Answer

NHTSA's study of single-vehicle rollover crashes showed no significant variation of risk among cars due to factors other than car size. That analysis did not specifically distinguish between mass vs. length/width. That is virtually impossible, because long, wide cars are almost always heavier than short, narrow ones. NHTSA's study of single-vehicle nonrollover crashes primarily addressed weight effects, rather than other factors.

Question 1d: Can a lighter-weight car be approximately as safe as a heavier car if the lighter car has particular features related to length, materials and design?

Answer

A heavier car will always be safer if that car has the same safety features relating to design and energy management control as the lighter car. Safety belts and other safety equipment can partially offset the effects of moderate weight reduction in some types of crashes. But in a head-on collision between two cars with a large weight difference (e.g., 1,000 pounds), even safety belts and other safety equipment will not make the occupants of the small car as safe as those in the large car.

QUESTIONS FROM SENATOR JOHNSTON

Question 2a: The auto companies maintain that most of the fuel economy improvement that occurred in that period was driven by market forces rather than CAFE standards. Do you agree?

Answer

Yes, we believe that most of the fuel economy improvement resulted from market forces. Even before the CAFE legislation was enacted in 1975, domestic auto manufacturers had planned to improve the fuel economy of their vehicles after the 1973 Arab oil embargo. In addition, the sharpest jumps in new car fuel economy levels occurred in the early 1980s, at the same time that fuel prices shot up. The average price per gallon of gasoline in the late 1970s and early 1980s changed as follows:

Calendar Year	
1978	$0.652
1979	0.882
1980	1.221
1981	1.353
1982	1.281
1983	1.225

At the same time, CAFE levels went up substantially for passenger cars through MY 1982, then dropped slightly for MY 1983 as fuel prices fell:

Model Year	CAFE Level	CAFE Std.
1978	19.9 mpg	18.0 mpg
1979	20.3	19.0
1980	24.3	20.0
1981	25.9	22.0
1982	26.6	24.0
1983	26.4	26.0

The trend of fuel prices and CAFE levels for this period demonstrate the strong impact of of fuel prices on market demand for fuel economy.

QUESTIONS FROM SENATOR JOHNSTON

Question 2b: If the auto companies are correct, is it fair to conclude that most of the safety decrease indicated by the studies you cite was market-driven?

Answer

Yes. One cannot simultaneously argue that most of the fuel economy increases were due to market forces and that the safety declines were due to CAFE regulations.

Question 2c: Is auto travel safer now than it was in the 1970s? Why?

Answer

Auto travel is much safer now than it was in the 1970s. The fatality rate per 100,000,000 vehicle miles has dropped from 4.9 in 1970 to 2.1 in 1990. The death rate per 100,000 population dropped from 27 to 19.

Young drivers, who have much higher fatality rates than persons over 30, have become a smaller proportion of the population. Many people have moved from rural to increasingly congested urban areas, reducing fatality rates. There are more divided, controlled-access highways and better protection from roadside structures. Major safety standards were just taking effect on new cars around 1970 and these standards, plus those issued since then, now apply to a high proportion of cars on the road. Safety belt use increased dramatically during the 1980s. People are consuming alcohol more responsibly, especially in regard to driving. For example, the proportion of all fatalities in traffic crashes involving at least one driver with a blood alcohol content of 0.10 percent or higher declined from 46 percent in 1982 to 39 percent in 1989.

Question 2d: Has the effect of auto safety regulation more than compensated for the decrease in safety attributable to downsizing?

Answer

The increase of 1,340 fatalities attributed to downsizing is overshadowed by the effects of safety belt usage and NHTSA's safety standards, which are saving 8,000 or more lives per year. However, without the downsizing, the savings would be much greater. See our response to Question 2e, below.

QUESTIONS FROM SENATOR JOHNSTON

Question 2e: If increased CAFE standards led to some additional weight reduction, could increased auto safety regulation compensate for some decrease in safety?

Answer

Over the years, NHTSA safety regulations and other actions (e.g., the building of better, safer highways) have dramatically improved the safety of cars of all weights. The substantial decline in the fatality rate over time demonstrates this. As air bags, improved side impact protection, antilock brakes, and other safety features become more prevalent, we anticipate further reductions in the fatality rate. This rate may decline even if average car weights drop somewhat. However, it is misleading to say that increased safety regulation is "compensating" for this weight decline. If car weights did not decline, there would be a greater drop in the fatality rate. The addition of a particular safety item to a vehicle might "compensate" for weight reduction by leaving the number of fatalities and injuries unchanged. However, if this safety technology were applied to a vehicle without weight reduction, there would be an actual reduction in the number of injuries and fatalities. We believe our programs should reduce highway casualties, not just leave them at the same level to offset another government program.

Question 2f: Do you have any sense of how much weight could be reduced while holding safety constant, in some sense, through a combination of increased auto safety regulation, length, materials, and design?

Answer

See our response to Question 2e. In addition, we expect that the NAS study to provide estimates of fuel economy levels that could practically be achieved for the next decade will address trade-offs in automotive design of weight versus safety, and the safety consequences of higher fuel economy levels.

QUESTIONS FROM SEN. JOHNSTON

Question 3: Please provide estimates of how many dedicated alternative fuel vehicles will be built under current law, and how the sale of these vehicles will affect the national average CAFE, taking into account the CAFE ratings of these vehicles under the Alternative Motor Fuels Act. The estimates should provide a range that accounts for the minimum number of such vehicles as required by law and higher numbers that reflect forecasts, if available, of higher market penetration. Please consult as needed with other agencies in the Administration in answering this question.

Answer

In accordance with the Alternative Motor Fuels Act of 1988, the Department of Energy has plans to purchase through the General Services Administration 700 flexible fueled passenger cars and 800 dedicated compressed natural gas (CNG) light trucks. The passenger cars will be operated on methanol or ethanol fuel blends (M-85 and E-85) with some of the cars operated on gasoline as control vehicles. These purchases will occur during the period of 1991 through 1995. This small number of vehicles will have only a negligible effect on the national average CAFE level or even on their manufacturers' CAFE levels. Neither this agency nor the Department of Energy has an estimate of the commercial demand for alternative fueled vehicles.

QUESTIONS FROM SENATOR WALLOP

Question 1a: Would you agree that regulatory interventions into the marketplace can impose unforeseen costs by reducing the flexibility of our economy and in the long-term reducing our options?

Answer

Yes, there is always the possibility of unforeseen results from market regulation, no matter how carefully the possible outcomes of an action are studied. In that regard, this agency always seeks to establish performance standards rather than design standards when a regulation is absolutely necessary. In that way, we do not prevent manufacturers from using the most innovative techniques to achieve cost effective solutions.

Question 1b: Would you agree that in order to be effective in promoting the most efficient use of energy, policy initiatives must rely on market forces?

Answer:

Yes, market forces are by far the most effective way to effect conservation of energy. If motor vehicle transportation becomes more expensive, consumers and manufacturers will find ways to reduce that cost through more fuel efficient vehicle designs, reduced discretionary travel, and greater use of mass transit without government intervention. Higher CAFE standards, in contrast, send a mixed signal. For example, any lower average consumption of fuel per mile travelled is partially offset by additional travel as the cost per mile of driving declines.

QUESTIONS FROM SENATOR WALLOP

Question 2: NHTSA Administrator Jerry Curry testified that if new legislation should necessitate a significant reduction in the average size and weight of the light duty vehicle fleet that recent gains in the safety of passenger car occupants would be compromised or lost.

a. In your judgment, has this consideration been reflected in proposals for a 40 mile per gallon CAFE standard?

b. Is this safety consideration being reflected in the current National Academy of Sciences study?

c. Have recently proposed safety rules and requirements of the Clean Air Act Amendments of 1990 been assessed for their effect on the industry's ability to further improve fuel economy?

Answer

a. We do not believe that this consideration has been reflected in proposals for a 40 mpg CAFE standard. Achieving this level of fuel efficiency for passenger cars would require substantial size and weight reductions, which would lead to increased deaths and injuries. NHTSA analyses have demonstrated that the move to smaller cars during the 1970s helped to improve fuel economy but resulted in more traffic deaths and injuries in these vehicles. As Secretary Skinner stated on September 14, 1990, "While total highway safety has improved in recent years, further major downsizing would result in a tragic tradeoff for the American public -- an elusive promise of greater fuel economy against a guarantee of increased highway deaths and injuries."

b. Safety considerations are a key component of the National Academy of Sciences study. As part of its plan to provide estimates of fuel economy levels that could practically be achieved in the next decade, the NAS will address trade-offs in automotive design of weight versus safety, and the safety consequences of higher fuel economy levels.

c. As part of the rulemaking process, the National Highway Traffic Safety Administration has evaluated the impacts of each significant safety regulation on fuel economy. For example, in its recent rulemaking upgrading side impact protection for passenger cars, the agency estimated that it would lead to a CAFE reduction of about 0.1 mpg. However, a comprehensive assessment of the combined impacts of the 1990 Clean Air Act Amendments and recent safety regulations has not been performed. This is one of the goals of the National Academy of Sciences study. In identifying and describing the principal barriers to the introduction and expanded usage of fuel economy technologies, among the factors evaluated by the National Academy of Sciences will be Federal and state regulations on environment and safety affecting vehicle design and operation, including new safety standards, the 1990 Clean Air Act Amendments, California Air Quality issues, the phase-out of chlorofluorocarbons, and the availability and use of alternative fuels.

QUESTIONS FROM SENATOR WALLOP

Question 3: The current CAFE debate centers on defining the maximum feasible average fuel economy for automobiles and light duty trucks.

a. When determining technical feasibility, what consideration is given to economic feasibility from the standpoint of the consumer? For example, what is the relationship between economic feasibility as that term is used and cost-effectiveness from the standpoint of the new car purchaser?

Answer

Under the existing statute, NHTSA determines maximum feasible average fuel economy in light of four criteria: technological feasibility, economic practicability, the effect of other Federal motor vehicle standards on fuel economy, and the need of the Nation to conserve energy. The statute does not elevate any one of these criteria above the others, nor does it provide guidance to the agency in weighing any of these criteria more heavily than others. Since all four factors must be considered, the agency's determination of the maximum feasible standard cannot be the level which is merely the maximum technologically feasible without regard to the economic practicability of such a level.

While NHTSA has not interpreted the statute as necessarily requiring fuel economy standards to be cost-beneficial, the agency has always considered costs and benefits in determining maximum feasible average fuel economy. Virtually all of the fuel-efficiency-enhancing technologies that have been used by the manufacturers to improve their fuel economy have been cost effective, or at least cost neutral.

The bill proposes to add a new paragraph 502(e)(2) to the Motor Vehicle Information and Cost Savings Act to set forth new criteria for determining maximum feasible average fuel economy. Given the paragraph's reference to technologies and designs that are "capable of being commercialized by the appropriate period," and the fact that consideration would be required to be given to "marketing limitations" on implementing technologies, we believe that costs and benefits would continue to be relevant under the proposed criteria.

QUESTIONS FROM SENATOR WALLOP

Question 3b: What consideration is given to the financial capability of a given manufacturer to incorporate a technically achievable technology within its new car product line? And how is such capability influenced by product year considerations? In other words, what are the time constraints on how fast a given manufacturer can turn over its product line?

Answer

NHTSA has always considered individual manufacturers' financial capabilities in setting CAFE standards, as part of the agency's consideration of the "economic practicability" criterion. The time constraints on how fast a given manufacturer can turn over its product line is dependent on many factors, including the manufacturer's overall financial condition, the size and expertise of its engineering and other technical staff, the size and nature of its testing facilities, the number of models to be changed, and the risks involved in introducing particular new technologies.

Question 3c: In your judgment, should any public policy goal to achieve greater fuel efficiency avoid excessive harm to the manufacturers or to the car-buying economy?

Answer

Yes, and given this important concern, and the complexity and uncertainty involved in projecting future manufacturer capabilities, we believe it is essential to retain administrative flexibility to account for changed circumstances in the future.

Question 4: What is the added cost if any of the various technological improvements such as variable valve control, fuel injection, etc., to the consumer in terms of frequency and cost of repairs?

Answer

There can be no definitive answer to this question. The frequency and cost of repairs of technological improvements depends on how fully developed the design is before it is put into production and the quality control the manufacturer imposes on its manufacturering processes. The improvements in process quality in recent years and the nature of many of the new technologies have improved the reliability and extended the routine maintenance intervals for many components of the modern automobile. On the other hand, the complexity of these component systems has tended to make diagnosis and repair of them more difficult and costly when there is a failure.

TECHNOLOGY ASSESSMENT BOARD
EDWARD M. KENNEDY, MASSACHUSETTS, CHAIRMAN
CLARENCE E. MILLER, OHIO, VICE CHAIRMAN
ERNEST F. HOLLINGS, SOUTH CAROLINA
CLAIBORNE PELL, RHODE ISLAND
TED STEVENS, ALASKA
ORRIN G. HATCH, UTAH
CHARLES E. GRASSLEY, IOWA
MORRIS K. UDALL, ARIZONA
GEORGE E. BROWN, JR., CALIFORNIA
JOHN D. DINGELL, MICHIGAN
DON SUNDQUIST, TENNESSEE
AMO HOUGHTON, NEW YORK
JOHN H. GIBBONS

Congress of the United States
OFFICE OF TECHNOLOGY ASSESSMENT
WASHINGTON, DC 20510-8025

DIRECTOR

March 12, 1991

The Honorable J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

I am pleased to submit OTA's response to the additional questions for the record of the February 28, 1991, hearing on Section 11 of S. 341. We appreciate the opportunity to assist you in your work.

Sincerely,

Steve Plotkin

Steven Plotkin
Senior Associate

Enclosure

OTA RESPONSE TO ADDITIONAL QUESTIONS ABOUT AUTOMOBILE FUEL ECONOMY FEBRUARY 28, 1991 HEARING ON TITLE II OF S.341 SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

QUESTIONS FROM SENATOR MURKOWSKI:

1. You outlined a plan in the hearing today which would base fuel economy ratings on the fleet composition of each manufacturer. Please outline this in greater detail for me and advise me of the effect this would have on total fuel economy ratings industry-wide.

Response. The type of standard I discussed in the testimony is one based on either vehicle size class or interior volume. I have discussed this type of standard in some detail in testimony to other committees, and I include excerpts from this testimony as attachments as my response to your question -- specifically, from my testimony to the Subcommittee on Energy and Power of the House Energy and Commerce Committee, on October 1, 1990, and from my testimony to the Consumer Subcommittee of the Senate Commerce, Science, and Transportation Committee, on May 2, 1989.

2. It was argued in the hearing today that S.341 would have different effects on foreign and domestic manufacturers, especially the Japanese manufacturers. Will the credit trading system outlined in S.341 have any effect on that disparity? What would the effect be?

Response. OTA has not examined in detail the effects of credit trading. However, it is clear that, *if credits are actually available for trading*, then they could allow the Japanese manufacturers to meet the standards (assuming that the standards have been set at levels that are achievable by the fleet as a whole). In effect, the credit trading changes the Japanese disadvantage from a technological disadvantage (they will have a harder time meeting the standard than the domestic manufacturers, and if the standard is very stringent, they might not be able to meet it at all) to an economic disadvantage (they would have to purchase credits from the domestic manufacturers). *If there are no credits available for trading*, the Japanese disadvantage will result either in their not being able to comply, or their being faced with having to restrict the size and performance of their fleet to a greater extent than would the domestic manufacturers, assuming all manufacturers have access to the same technology.

QUESTIONS FROM SENATOR WALLOP:

1.a. Would you agree that regulatory interventions into the marketplace can impose unforeseen costs by reducing the flexibility of our economy and in the long-term reducing our options?

Response. Yes, but *failure* to intervene can, under certain circumstances, impose the same types of costs. The Savings and Loan crisis is an excellent example of such circumstances. Because energy use imposes costs that currently are not valued by the marketplace, many policymakers believe that intervention -- either through economic incentives or regulations -- is necessary to avoid over-consumption of energy and the costs this imposes on our economy and environment.

Regulatory intervention can impose costs -- not necessarily unforeseen -- because intervention can distort the marketplace. However, the costs can be minor or very large depending on how severe the intervention is and on the manner in which it is done. As I discussed in my testimony, there is a risk that fuel economy standards, if set too high or if applied in an inefficient manner, will force automakers to face high costs and perhaps lose sales (because of higher prices and/or a reduction in vehicle attributes that consumers desire). However, there are many options open to Congress to intervene in the automotive market, and some of these may trade off moderate costs and market distortions against desirable improvements in our oil trade balance, total oil and energy use, and energy security.

b. Would you agree that in order to be effective in promoting the most efficient use of energy, policy initiatives must rely on market forces?

Response. I cannot agree with the statement as posed. It has been well established in this country and elsewhere that regulatory controls can yield more efficient use of the environment -- because environmental costs often are not explicitly valued by the marketplace. In the same manner, well-structured regulatory controls on energy use can lead to more efficient use, because many of the costs of such use (emissions of carbon dioxide and other pollutants, energy security costs of increased oil imports, and so forth) are not valued by the marketplace. I *would* agree, however, that the use of economic incentives in place of or in support of regulatory controls can yield better results than the solo use of such controls.

2. NHTSA Administrator Philip Smith testified that if new legislation should necessitate a significant reduction in the average size and weight of the light duty vehicle fleet that recent gains in the safety of passenger car occupants would be compromised or lost.

a. In your judgment, has this consideration been reflected in proposals for a 40 mile per gallon CAFE standard?

Response. OTA has no knowledge of the extent to which Senator Bryan and his staff incorporated safety concerns into the 40 mpg proposal. According to our analysis, if no brand new technologies (that is, no technologies not now available on at least one model) enter the fleet before 2001, then a 40 mpg standard cannot be met without some downsizing. However, the 10-year interval between now and 2001 offers some potential for new technologies -- for example, two-stroke engines, or direct injection lean-burn engines using new catalyst technology for control of NO_x -- to begin to impact fleet fuel economy by 2001. It appears feasible, though by no means certain, that a 40 mpg standard could be met by 2001 with some combination of new technology, wider use of existing technologies, limits on vehicle performance, and weight reduction that does not compromise safety (material substitution need not compromise structural integrity and safety). Further, moderate reductions in average size and weight could be accommodated without a loss in overall fleet safety, because there are compensating measures available (antilock brakes, passenger side airbags, etc.).

b. Is this safety consideration being reflected in the current National Academy of Sciences study?

Response. OTA is not sufficiently familiar with the details of the National Academy study to comment.

c. Have recently proposed safety rules and requirements of the Clean Air Act Amendments of 1990 been assessed for their effect on the industry's ability to further improve fuel economy?

Response. OTA is not aware of a formal executive branch analysis of this effect. However, analyses by industry and others appear to converge on an overall impact of about 3 percent (about 1 mpg for the domestic fleet) for the combined effect of the Tier 1 emissions standards and those safety standards either enacted or under active consideration. We suspect that this effect could be reduced somewhat if fuel efficiency becomes more highly valued than it is today.

3. The current CAFE debate centers on defining the maximum feasible average fuel economy for automobiles and light duty trucks.

a. When determining technical feasibility, what consideration is given to economic feasibility from the standpoint of the consumer? For example, what is the relationship between economic feasibility as that term is used and cost-effectiveness from the standpoint of the new car purchaser?

Response. Section XI as proposed does not define explicitly how economic feasibility is to be taken into account in defining the maximum feasible average fuel economy values. Instead, it asks that "economic practicability" and "financial and marketing limitations" be taken into account in defining this value. In the EEA and OTA analyses of fuel economy potential, consumer-oriented cost-effectiveness is explicitly taken into account in all but the "maximum technology" scenarios, by selecting only those technologies that satisfy cost payback considerations. For example, a "product plan" scenario incorporates major technology groups (that is, engines, transmissions) in announced company plans and further incorporates only those other (lesser) technologies whose higher first costs are repaid by the fuel savings during the first four years of vehicle ownership.

b. What consideration is given to the financial capability of a given manufacturer to incorporate a technically achievable technology within its new car product line? And how is such capability influenced by product year considerations? In other words, what are the time constraints on how fast a given manufacturer can turn over its product line?

Response. In the EEA model, **time constraints are explicitly considered. I have asked** Mr. Duleep **to answer this question in detail.**

c. In your judgment, should any public policy goal to achieve greater fuel efficiency avoid excessive harm to the manufacturers or to the car-buying economy?

Response. OTA believes that fuel economy regulations certainly *could* hurt the manufacturers somewhat unless oil prices rise, or are raised, higher than anticipated within the next decade to decade and a half. However, costs to the manufacturers must be balanced against the benefits gained by reducing gasoline use. The key to avoiding *excessive* costs is to appropriately balance national environmental and energy conservation concerns with automaker concerns.

4. What is the added cost if any of the various technological improvements such as variable valve control, fuel injection,etc., to the consumer in terms of frequency and cost of repairs?

Response. OTA has not explicitly evaluated these costs. We note, however, that the technologies evaluated for our 1996 and 2001 scenarios have all been introduced to the fleet, and this during a time when vehicle reliability has generally been acknowledged to be improving.

ADDITIONAL QUESTIONS

A. What consideration was given to the cost-effectiveness or the financial capability of individual manufacturers in arriving at your conclusions on what energy efficiency technologies are available?

Response. As noted above, the cost-effectiveness to consumers of the technologies has been explicitly considered in all scenarios except the "maximum technology" scenario. As to the financial capabilities of the individual manufacturers, current trends in the market towards joint ventures in-vehicle design and planning (the joint Ford and Mazda effort in designing the Escort), and towards purchase of complete subassemblies (Chrysler's purchase of engines from Mitsubishi) makes the financial analysis of these capabilities to pursue new technology initiatives somewhat irrelevant to their ability to *obtain* new technologies. We note that all of the manufacturers have announced plans to incorporate many of the technologies identified in the EEA analyses.

B. Would you agree that analyses of the feasibility of meeting any specified automotive fuel economy must of necessity assume retention of both the Tier I and Tier II emission standards contained in the 1990 Clean Air Act Amendments? To do otherwise would lead to overly optimistic estimates of potential fuel efficiency gains.

Response. Analyses of fuel economy standards must examine and incorporate the effects of other standards on fuel economy. The EEA analyses incorporate the effects of the Clean Air Act Tier 1 standards and the new side-impact safety regulations. At the moment, the Tier II standards are optional. Also, their enactment would force production of dedicated alternative fuel vehicles that would in turn generate very large fuel economy credits for the automakers.

a. What assumption did you make with regard to the Tier I and Tier II requirements in 1990 Clean Air Act Amendments? If I am not mistaken your initial analyses were performed prior to enactment of the 1990 Amendments.

Response. As noted, the fuel economy effects of the Tier I standard is incorporated into our fuel economy values. Effects of Tier II standards are not included. EEA's initial analyses were performed before enactment of the 1990 amendments and did not incorporate new clean air requirements.

b. Reportedly electrically heated catalysts may be needed to meet the more stringent Tier II emission standards for HC and CO. If so, the accompanying weight increases together with other engine modifications are estimated by some experts to reduce fuel economy by 7 percent. Would you comment?

Response. OTA understands that the 7 percent figure is cited by one analyst only, and that figure is for the city cycle, not the entire driving cycle (there would be little effect on the highway cycle). In OTA's view, it is premature to draw conclusions both about the necessity of electrically heated catalysts and about their effect on fuel economy. However, early test results do imply a need for concern about the potential for a high fuel economy impact.

c. Another concern is limitations on the use of certain engine technologies in meeting the Tier II emission standards. For example, lean-burn gasoline technologies which are utilized in Europe by companies such as Toyota are capable of achieving a 10 percent increase in fuel economy over comparable gasoline engine technologies. However, I understand that with such technology it is very difficult to control nitrogen oxides emissions to the levels required by the Tier II emissions standards in the 1990 Amendments. Would the CAA's Tier II standards preclude use of such promising energy efficiency technologies in the United States to meet CAFE standards?

Response. The Tier II standards certainly represent an obstacle to deployment of lean burn and perhaps other technologies, but it is premature to conclude that the standards *preclude* use of such technologies. Toyota currently is developing catalyst technology designed to remove nitrogen oxides in an oxygen-rich (lean) environment. If they succeed, lean-burn engines could coexist with the Tier II standards.

d. If so, is it not unrealistic to base U.S. efficiency standards on European experience with such technologies?

Response. If lean-burn engines and other technologies cannot meet Tier II standards, it would be unrealistic to base U.S. efficiency standards on such technologies. To OTA's knowledge, current Senate proposals for more-stringent efficiency standards are *not* based on European experience. We note that the EEA/OTA analyses do not include lean-burn engines as a candidate technology.

D. One of the objectives of the Administration's National Energy Strategy and S.341 is to foster the use of alternative fuels such as natural gas in automobiles and light trucks. Yet compressed natural gas burns at extremely high temperatures which lead to difficulty in controlling nitrogen oxide emissions.

a. Does the Clean Air Act constrain the feasibility of use of CNG as an alternative transportation fuel?

Response. Probably not. Developers of natural gas vehicles believe that they can comply with emissions standards for nitrogen oxides, and prototype vehicles have met the Tier I standards. Incidentally, combustion temperature depends on many factors other than the type of fuel used, and natural gas does not have to burn at "extremely high temperatures."

b. Would similar constraints also apply to flexible fuel vehicles which are capable of using gasoline or methanol?

Response. Flexible fuel vehicles should be able to meet nitrogen oxide emissions standards.

E. Earlier DOE estimated that a 0.7 grams per mile nitrogen oxide standard could increase oil consumption in 2010 by 250,000 barrels per day and could restrict or eliminate the use of diesel engines in light duty trucks. By comparison, a standard of 0.4 grams per mile standard would increase oil consumption by only 50,000 barrels per day. Would you comment?

Response. OTA is not familiar with these estimates. We note, however, that the numbers cited in the question appear contradictory. It seems unlikely that a more stringent standard would yield a lower oil consumption. This would occur only if the more stringent standard forced the introduction of an entirely new technology, at sufficiently higher cost to preclude its use otherwise, that incidentally was less of an energy drain.

Excerpts from Testimony of S. Plotkin, OTA, to Consumer Subcommittee, Senate Commerce, Science and Transportation Committee, May 2, 1989

C. What One Potential Fuel Economy Standard Might Look Like. OTA has constructed a theoretical set of fuel economy standards based on the size-class mix of each manufacturer, to serve as an example of an alternative to the current uniform CAFE standard. This example illustrates a first, over-simplified step in the process of constructing a fuel economy standard that would establish a uniform technological challenge to each manufacturer. We note that policymakers who might prefer that a standard create incentives for a move to smaller vehicles may consider a uniform challenge to be undesirable.

---

48. Counterbalanced to some extent by increased jobs and profits in the auto repair sector.

The hypothetical standard establishes a target fuel economy for each size class that is a uniform percentage increase over the 1988 U.S. new car fleet fuel economy for that size class. The 1988 new car fleet fuel economy was 28.3 mpg. If, for example, policymakers would like the 1995 fleet average to approach 33 mpg -- OTA's "cost-effective achievable level," as defined above -- the target mpg improvement for each size class would be the same percentage improvement that the entire fleet would have to achieve, or

(33-28.3)*100/28.3 percent, or 16.6 percent.[49]

Table 5 presents the actual 1988 and required 1995 fuel efficiency for each size class, to achieve a 33 mpg fleet average. To allow maximum flexibility for the industry, each manufacturer would have a single company standard equal to the sales weighted average of the size class targets. In the extreme, a company that sold only minicompacts would have to achieve 43.3 mpg by 1995; a company that sold exclusively large cars would have to achieve 28.1 mpg by 1995.

Because there are substantial differences among automakers in the mix of vehicle sizes in their new car fleets, there will be substantial differences in the fuel economy target they will have to meet under this standard. Figure 10 shows the targets for each of 9 major manufacturers -- the three domestic makers, the 4 largest Japanese makers, 1 Korean

---

[49] Because of roundoff errors in the market shares, the actual percentage used in our calculations to achieve 33 mpg for the fleet was 15.7 percent.

Table 5. A FUEL ECONOMY STANDARD BASED ON VEHICLE SIZE CLASS

Size class mpg goals based on a uniform scaleup from 1988 mpg levels

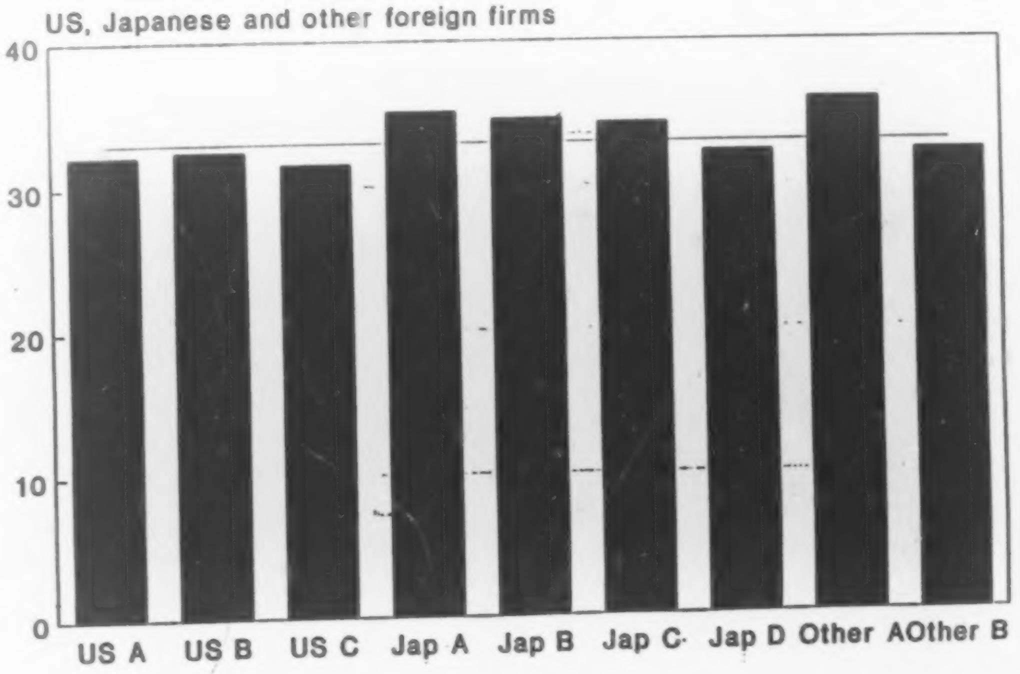
Size Class	1988 Market Share,%	1988 mpg,actual	1995 mpg,goal
minicompact	.8	37.4	43.3
subcompact	20.4	31.1	36.0
compact	39.2	29.6	34.2
midsize	24.9	26.8	31.0
large	12.9	24.3	28.1
2-seater	1.8	27.2	31.5
FLEET	100.0	28.3	33.0[1]

---

[1] Assumes that the size mix of the 1995 fleet is identical to that of the 1988 fleet.

Source: Office of Technology Assessment, based on Oak Ridge data

FIGURE 10.



Size Class Weighted Fuel Economy Targets
to reach fleet average of 33 MPG by 1995

SOURCE: OFFICE OF TECHNOLOGY ASSESSMENT, BASED ON OAK RIDGE DATA

maker, and 1 European maker -- assuming their sales mix in 1995 is identical to their 1988 mix.[50] The targets vary from 31.6 mpg for a domestic maker to 35.2 mpg for a Japanese company and 36.0 mpg for the Korean company.

A standard of this sort would directly address the criticism of the current CAFE standards, often brought by the domestic manufacturers, that they give an unfair advantage to the companies' Japanese competitors. In fact, the use of this approach to fuel economy standards provides a method to compare the fuel economies achieved by the various manufacturers in a manner that removes the effect of differences in the mix of size classes in their fleets. To do this, we devised a set of company-by-company size class mix-weighted standards to reach the *actual* fleet new car fuel economy in 1988 -- 28.3 mpg -- and compared these standards to the manufacturers' achieved fuel economies. Where the manufacturers' achieved values were above, below, or the same as the standards, the manufacturers' cars were better than, worse than, or the same as the industry average fuel economy adjusted to account for the sales mix of the fleet.

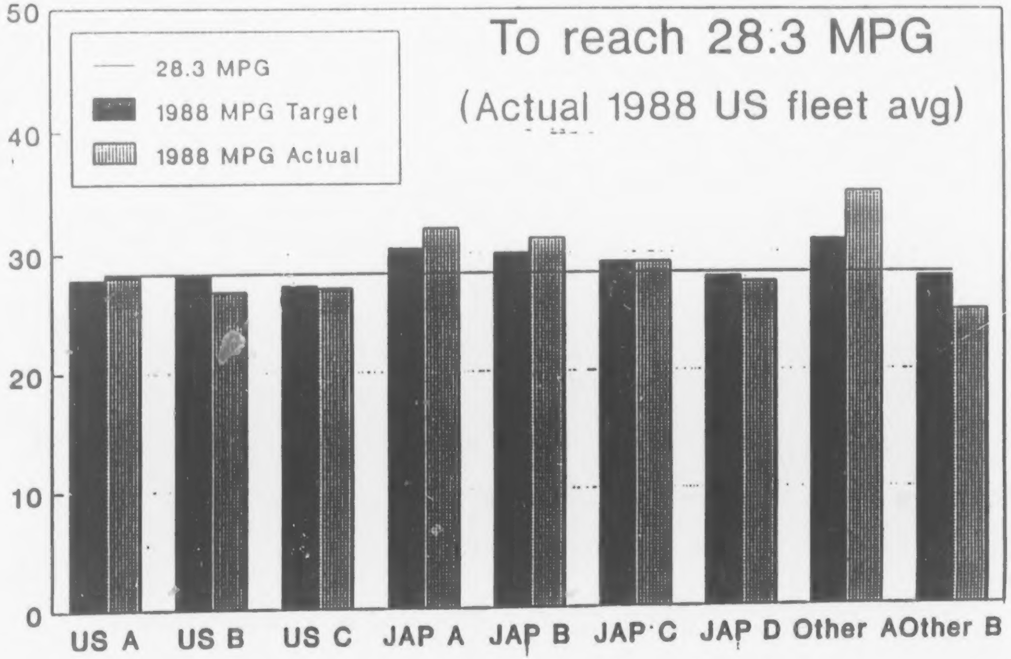
Figure 11 compares the company-by-company targets with the fuel economy values actually achieved in 1988. The figure shows that two of the three U.S. companies are within 1 percent of their targets, that is,

---

[50] Because some of the Japanese companies are entering the large car markets, their actual targets are likely to be below these values unless the larger cars are brought out under a different nameplate.

FIGURE 1

Size Class Weighted Fuel Economy
Actuals vs Targets, 1988



SOURCE: OFFICE OF TECHNOLOGY ASSESSMENT, BASED ON OAK RIDGE DATA

their fleet fuel economies are near the industry average *taking into account the size class mix of their fleets*. Half of the Japanese companies are well over the industry average, with the other half at or near the average. And the European company is considerably under the average.

This comparison shows that ***differences in the size class mix of the domestic and import fleets account for much, though not all, of the differences in the fuel economies of these fleets***. For example, of an 18 percent difference in the fuel economy levels of an often-compared U.S. and Japanese manufacturer, approximately 12 percent -- two thirds -- of the difference is explained by the difference in size class mix.

We conclude by noting that the Congress has an extremely difficult decision to make concerning the future of the U.S. automobile and light duty truck fleets. If no further action is taken, the total fleet will continue to improve, primarily because of vehicle turnover. The new car fleet may also improve in efficiency, but this is uncertain because modest improvements in technology and design could easily be overcome by higher performance levels, design decisions favoring first cost over fuel economy, and other factors. At best, total fuel use of the light duty fleet might stay level, although a gradual rise may be more likely. In any event, increased oil use in other transportation sectors and declining U.S. domestic oil production will lead to increasing oil imports.

Power, House Energy and Commerce Committee, October 1, 1990

ALTERNATIVES TO THE CURRENT CAFE STANDARD

The current CAFE standard assigns a uniform goal of 27.5 mpg to every automaker regardless of the type and mix of vehicles they produce. The domestic automakers have severely criticized this regulatory structure because, with all manufacturers having to meet the same fuel economy level, those producing larger vehicles, or a variety of vehicle sizes, must meet a more demanding technological standard than manufacturers who concentrate on smaller vehicles that normally are more fuel efficient.[2] This leaves automakers who focus on small cars far more flexibility than the "full line" manufacturers" to introduce features that are attractive to consumers but fuel inefficient -- features such as 4-wheel drive, high performance engines, etc. Further, the fuel economy standard that is selected under such a structure will tend to be limited politically by the fuel economy level that can be reached by the company with the most difficult task (i.e., the largest, most powerful mix of vehicles), since Congress is unlikely to approve a standard that absolutely cannot be achieved by one of the large automakers. Since such a standard will provide little challenge to companies manufacturing primarily small vehicles, the fleetwide fuel economy level that can be achieved by such a standard will be lower than could be achieved if some way were found to force *all* the automakers to improve their fuel economy to the maximum extent possible.

---

[2] Obviously, there are some small cars that are high-powered sports models obtaining relatively low fuel economy levels. However, vehicle size is a critical factor in fuel economy, and manufacturers of small vehicles will almost always have an easier task than manufacturers of large vehicles in meeting the same fuel economy standard.

As you know, last spring Senator Bryan introduced legislation calling for all automakers to improve their companywide fuel economy levels by 20 percent by 1995, and 40 percent by 2001, over the levels they had already achieved. This legislation seeks to overcome the criticism leveled at the current uniform standard by forcing all automakers to improve by the same amount.

In my May 2, 1990 testimony to the Consumer Subcommittee of the Senate Committee on Commerce, Science, and Transportation, I discussed in some detail a potential structure for future fuel economy standards that might serve as an alternative to the current single uniform standard for each company as well as to the percentage increase approach proposed by Senator Bryan. The proposal was to base each automaker's standard on the size mix of vehicles it manufactured, with makers of small cars given a higher mpg target than makers of large cars to reflect the inherent fuel economy advantage of small cars over large cars. Ideally, to meet their individual mpg standards, each company would have to install about the same level of fuel economy technology as every other company. In other words, if the standard was set correctly, no automaker would be given a market advantage or disadvantage by the fuel economy regulations.

The standard would work as follows:

(1) Each vehicle model in an automaker's fleet would be assigned a fuel economy target according to a formula relating required fuel economy to vehicle interior volume. (Alternatively, each vehicle size class could be given a fuel economy value, and each vehicle would then be given a target based simply on its size class.)

(2) Each company's fuel economy standard would then be calculated by taking the sales-weighted average of the various fuel economy targets assigned to all of its models. This company standard could be computed at the beginning of the year, based on last year's sales mix, or at the end of the year based on actual sales.

(3) It is worth noting that *each model* in an automakers fleet would not have to meet its fuel economy target so long as the sales-weighted average of all of the makers' models achieved the assigned standard. This leaves each company with the flexibility of deciding individually how it wishes to allocate fuel economy technology across its fleet, and further allows it to have a mix of family oriented, commuter, and high performance models so long as the average of their fuel economies is high enough to satisfy the company standard.

(4) The formula for assigning fuel economy targets can be established by the government so as to aim for any specified fleetwide average desired. The formula would have to based on extrapolating from the most recent data on fleetwide size distribution, so that unexpected shifts in sales, for example from larger to smaller cars or vice versa, would result in the fleet attaining a fuel economy level slightly different than that predicted. The differences would not be large unless large shifts in sales occurred.

In my view, both Senator Bryan's "uniform percentage increase" and OTA's "interior volume-based standard" represent an improvement over the current CAFE approach because they both recognize and account for differences in fleet makeup among the various automakers. The Bryan approach is simpler in concept and is easier to understand and explain than the volume-based standard. However, the Bryan approach makes no allowance for differences in the degree to which the various automakers have applied fuel economy technology. To the extent that some automakers may now be using a higher level of technology than others, this approach penalizes these automakers by giving them a more difficult mpg target than other automakers who might have fleets similar in size mix but inferior in their use of efficiency technology.[3] In doing so, it rewards companies that have made the least effort thus far, since these have the most technological "headroom" to further improve their fuel economies. Furthermore, by assigning standards based on company fuel economies achieved years earlier, this approach will make it difficult for automakers to shift sales strategies unless these shifts are towards a fleet with smaller vehicles. This will tend to discourage the Japanese automakers from pursuing their current strategy of competing with domestic and European manufacturers in the luxury and larger car segments of the market. In other words, it may be viewed as anticompetitive.

If the volume-based standard were based on actual sales (that is, each company's standards are computed at the end of the year based on that year's sales figures), it gives automakers the flexibility to change sales strategies without making their fuel economy targets impossibly difficult to attain. This type of standard further avoids penalizing automakers if market trends change unexpectedly, since their standards would change to reflect the changing sales figures. However, the volume-based standards "size neutrality" -- the fact that small cars have as difficult a standard to reach as do large cars -- means that there is no *incentive* for an automaker to try to boost sales of small cars, a feature of the current CAFE standard and, indeed, any standard based on a formula that does not change with shifts in fleet size mix. To the extent that Congress might want to encourage consumers to drive smaller cars, which tend to be more fuel efficient, the volume-oriented standard would not be favored. It should be noted, however, that the design of the volume-oriented standard could be skewed to favor small cars (that is, designed so that small cars have a slightly easier target to reach than larger cars), or such a standard could be coupled with another standard that favored small cars (for example, a floor on the percentage increase in fuel economy that each automaker had to achieve, say 10 and 20 percent by 1995 and 2001 compared to the Bryan proposals 20 and 40 percent).

---

[3] In a rudimentary analysis of manufacturer-by-manufacturer fuel economies that I conducted for my May 2, 1990 testimony, I found that there *were* some important differences between the fuel economies of the various automakers that could not be explained solely by the size mix of their fleets and were likely due, at least in part, to differences in the degree to which the different automakers were using fuel efficiency technologies.

As a final note to this part of my discussion:

The relative *short-term* inflexibility of automaker manufacturing strategies, due to their need to make orders for outsourced components and manufacturing dies and other equipment years in advance of the model year, coupled with the substantial risk involved in moving new technologies into the fleet too soon, presents Congress with a significant dilemma in specifying major increases in fuel economy standards for the relatively near future, e.g. 1995. If Congress does not specify stringent standards for this time frame, it runs the risk of the manufacturers presenting it with a "fait accompli" of noncompliance later on with little remedy other than massive, and perhaps politically unacceptable, economic penalties. On the other hand, demanding short-term fleetwide fuel economy increases may expose some automakers to large risks associated with moving new technologies widely into their fleets without having the time to test the technologies for a few years in one or two models. A potential solution to this dilemma is to designate interim milestones for the automakers which involve demonstration of a few high-fuel-economy models with requirements for minimum acceptable production runs. In other words, require the automakers to show that they're testing out new designs and technologies in a real world situation, but don't require them to risk their whole fleet.

IMPROVING FLEET FUEL ECONOMY BY ACCELERATING THE RETIREMENT OF OLDER VEHICLES

Vehicle turnover is the single most important factor in improving the overall fuel efficiency of the entire U.S. fleet of automobiles. Even if new car efficiency stagnates at current levels, fleet efficiency will continue to rise as old gas guzzlers are retired and are replaced with new, more efficient vehicles. Some analysts have suggested the option of *speeding up* this process by buying up old gas guzzlers and scrapping them. Unocal is now conducting a demonstration project of this nature in California, though the primary goal of this project is to reduce emissions rather than to improve fuel economy -- according to Unocal, the older cars it is scrapping each produce 25-30 times the pollution (per mile of driving) of a new car. Consequently, a national program to accelerate the retirement of older vehicles would serve both energy conservation and pollution reduction purposes.

purchasers perceived -- generally correctly -- that the large cars were safer. Certainly, many purchasers for whom a small, fuel-efficient car would be *functionally* acceptable, and in many ways preferable -- for example, workers seeking a car primarily for commuting, or parents buying a first car for their teenage child -- may instead buy a larger car for safety's sake. Yet the above-mentioned design competitions demonstrated that extremely safe small cars *could* be manufactured. Perhaps such purchasers would be willing to switch away from their full-sized sedans if they were offered an alternative small car with high safety credibility.

F. The Structure of Current and Future Fuel Economy Standards. OTA generally agrees with the domestic manufacturers (Ford and General Motors) that the current CAFE standards discriminate against manufacturers that produce a full line of vehicles, or that wish to concentrate on larger vehicles because that is where their marketing strength lies. Because the current standards establish a uniform mpg target, manufacturers producing larger vehicles, or a variety of vehicle sizes, must meet a more demanding *technological* standard than manufacturers who concentrate on smaller vehicles that are inherently more fuel efficient.

This would not harm the full line manufacturers if consumers valued fuel efficiency highly, since potential car buyers would tend to prefer vehicles whose efficiency-related design and equipment was more advanced. Under today's market conditions, however, ***attributes that are*** *in conflict with fuel economy -- high performance, 4-wheel drive, luxury equipment, etc. -- often are more preferred than higher fuel economy.* Manufacturers of small cars have fewer restrictions on incorporating these features into their models. Further, potential buyers may be willing to pay a smaller premium for higher fuel economy than this attribute costs the manufacturer, either making the higher efficiency vehicle less attractive or lowering profits by forcing the manufacturer to swallow the extra costs of efficiency measures.

A potential alternative to the current CAFE system is to set a fuel economy standard that is a function of the size mix of each manufacturer's fleet. A separate fuel economy value could be assigned to each vehicle size category, or the value could be a continuous function of vehicle interior volume.[47] The manufacturer's overall fleet standard could then be determined by calculating a sales-weighted standard based on his actual sales.

There are two important advantages of a standard of this type. First, it would avoid penalizing full-line manufacturers, because the severity of the standard would change with the size mix of the manufacturer's fleet. If structured properly, such a standard would establish more of a "level technological playing field," that is, it would make more uniform the technological challenge involved in complying with the standard. With such a standard, the competitiveness of the domestic industry should not suffer *if the industry can match its import competition on a technological basis*.

---

[47] The advantage of a continuous function would be that manufacturer's would not then be tempted to boost the size of some of their vehicles just enough for them to qualify for the next largest size class -- and a less stringent standard.

Second, because each manufacturer's fleet standard would be based on the actual size mix of vehicles sold in that year, the role of changing market conditions -- at least to the extent that such conditions change consumer preferences for large vs. small cars -- would be reduced.

Congress must recognize, however, that this type of standard, or any other that we can think of, will not avoid distorting the market somewhat. The purpose of fuel economy standards is to force manufacturers to boost fuel efficiency more than the manufacturers believe the market alone warrants. Unless Congress is a better judge of future markets than the companies are, the standards are more likely than not to produce a new car fleet that is less attractive to consumers than the fleet would have been with no standards. The fleet will be some combination of more expensive, less powerful, less luxurious, and less stylish than it would otherwise have been.

This may be warranted if improved fuel efficiency has a value to the United States that is not factored into consumer car purchasing decisions -- for example, the national security benefits of reduced oil imports, or the benefits of lowering emissions of greenhouse gases -- and *if* the market distortions caused by standards do not overwhelm the benefits. For example, Congress must guard against standards that may

NATIONAL RESEARCH COUNCIL

2101 CONSTITUTION AVENUE WASHINGTON, D.C. 20418

EXECUTIVE OFFICE

March 15, 1991

The Honorable J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
U.S. Senate
Washington, DC 20510

Dear Senator Johnston:

I am responding to your letter of March 5 pertaining to your committee's recent hearings on Corporate Fuel Economy Standards, and some follow-up questions submitted by Senator Wallop.

The issues underlying Senator Wallop's questions are important. We expect that many of them will be addressed during the course of the study currently underway at the National Research Council. We look forward to sending you a copy of the report when the study is completed.

Sincerely,

Philip M. Smith
Executive Officer

THE NATIONAL RESEARCH COUNCIL IS THE PRINCIPAL OPERATING AGENCY OF THE NATIONAL ACADEMY OF SCIENCES AND THE NATIONAL ACADEMY OF ENGINEERING
TO SERVE GOVERNMENT AND OTHER ORGANIZATIONS

J. BENNETT JOHNSTON, LOUISIANA, CHAIRMAN

DALE BUMPERS, ARKANSAS
WENDELL H. FORD, KENTUCKY
BILL BRADLEY, NEW JERSEY
JEFF BINGAMAN, NEW MEXICO
TIMOTHY E. WIRTH, COLORADO
KENT CONRAD, NORTH DAKOTA
DANIEL K. AKAKA, HAWAII
WYCHE FOWLER, JR., GEORGIA
RICHARD C. SHELBY, ALABAMA
PAUL WELLSTONE, MINNESOTA

MALCOLM WALLOP, WYOMING
MARK O. HATFIELD, OREGON
PETE V. DOMENICI, NEW MEXICO
FRANK H. MURKOWSKI, ALASKA
DON NICKLES, OKLAHOMA
CONRAD BURNS, MONTANA
LARRY E. CRAIG, IDAHO
JOHN SEYMOUR, CALIFORNIA
JAKE GARN, UTAH

BENJAMIN S. COOPER, STAFF DIRECTOR
D. MICHAEL HARVEY, CHIEF COUNSEL
G. ROBERT WALLACE, STAFF DIRECTOR FOR THE MINORITY
GARY G. ELLSWORTH, CHIEF COUNSEL FOR THE MINORITY

United States Senate

COMMITTEE ON
ENERGY AND NATURAL RESOURCES
WASHINGTON, DC 20510-6150

March 5, 1991

Mr. Philip M. Smith, Executive Officer
National Resources Council
National Academy of Sciences
2101 Constitution Avenue, N.W.
Washington, D. C. 20418

Dear Mr. Smith:

I would like to thank you for your recent appearance at the hearing held by the Committee on Energy and Natural Resources on February 28, 1991. Your time and effort to provide the Committee with your views concerning the provisions of S. 341 pertaining to Corporate Average Fuel Economy (CAFE) are greatly appreciated.

In order to assist the Committee in its consideration of this pending legislation, I am attaching additional questions from our Members for inclusion in the hearing record. In anticipation of closing the hearing record on this hearing by Friday, March 15, 1991, I would appreciate your sending your responses to Karl Hausker of the Committee staff by close of business on that date.

Again, thank you for your testimony. I look forward to receiving your additional comments.

Sincerely,

J. Bennett Johnston
Chairman

JBJ/kah

Questions for Mr. Philip M. Smith, NAS, from
Senator Malcolm Wallop (R-WY)
CAFE provisions of S. 341, the Energy Security Act of 1991
February 28, 1991

Panel II (as reconstituted)

1. The Administration has estimated that energy demand and supply initiatives can achieve comparable benefits under a balanced national energy strategy. By the year 2000, oil consumption can be reduced by 1.3 million barrels per day and domestic oil production can be increased by 1.8 million barrels per day. By the year 2010, oil consumption can be reduced by 3.4 million barrels per day and domestic oil production can be increased by 3.8 million barrels per day.

   Would you agree that it is not enough to foster energy efficiency and the use of renewable energy resources, but we also must develop an energy policy which takes all reasonable steps to promote domestic energy production?

2. The current CAFE debate centers on defining the maximum feasible average fuel economy for automobiles and light duty trucks.

   a. When determining technical feasibility, what consideration is given to economic feasibility from the standpoint of the consumer? For example, what is the relationship between economic feasibility as that term is used and cost-effectiveness from the standpoint of the new car purchaser?

   b. What consideration is given to the financial capability of a given manufacturer to incorporate a technically achievable technology within its new car product line? And how is such capability influenced by product year considerations? In other words, what are the time constraints on how fast a given manufacturer can turn over its product line?

3. What is the added cost if any of the various technological improvements such as variable valve control, fuel injection, etc., to the consumer in terms of frequency and cost of repairs?

4. Internationally, what correlation is there between CAFE standards in Japan and Europe and per capita fuel consumption?

5. What effect has existing CAFE standards in the United States had on per capita fuel consumption? And on vehicle miles driven?

6. Would you agree that analyses of the feasibility of meeting any specified automotive fuel economy must of necessity assume retention of the emission standards contained in the 1990 Clean Air Act Amendments?

7. There are press reports of experimental cars capable of achieving over 50 miles per gallon. Why are the constraints on making such cars available to consumers?

CABLE: "UAW DETROIT"

Solidarity House
8000 EAST JEFFERSON AVE
DETROIT, MICHIGAN 48214
PHONE (313) 926-5000

INTERNATIONAL UNION, UNITED AUTOMOBILE, AEROSPACE & AGRICULTURAL IMPLEMENT WORKERS OF AMERICA—UAW

OWEN F. BIEBER, *PRESIDENT*   BILL CASSTEVENS, *SECRETARY-TREASURER*

VICE-PRESIDENTS: ODESSA KOMER • ERNEST LOFTON • STAN MARSHALL • STEPHEN P. YOKICH

March 13, 1991

Karl Hausker
Chief Economist
Committee on Energy and
  Natural Resources
United States Senate
Washington, D. C. 20510

Dear Mr. Hausker:

This is in response to the letter of March 5, 1991 from Chairman Johnston requesting answers to questions posed by Senator Wallop in connection with the hearing on the provisions of S. 341 relating to CAFE. My responses to Senator Wallop's questions are attached.

I would again like to thank Chairman Johnston for giving us the opportunity to testify on the CAFE provisions in S. 341. The UAW looks forward to working with the Committee as it considers this important legislation.

Sincerely,

Owen Bieber

Owen Bieber
President

OB:car
opeiu494

Questions for Mr. Owen Bieber, UAW, from
Senator Malcolm Wallop (R-WY)
CAFE provisions of S. 341, the Energy Security Act of 1991
February 28, 1991

Panel II (as reconstituted)

1. The Administration has estimated that energy demand and supply initiatives can achieve comparable benefits under a balanced national energy strategy. By the year 2000, oil consumption can be reduced by 1.3 million barrels per day and domestic oil production can be increased by 1.8 million barrels per day. By the year 2010, oil consumption can be reduced by 3.4 million barrels per day and domestic oil production can be increased by 3.8 million barrels per day.

   Would you agree that it is not enough to foster energy efficiency and the use of renewable energy resources, but we also must develop an energy policy which takes all reasonable steps to promote domestic energy production?

2. The current CAFE debate centers on defining the maximum feasible average fuel economy for automobiles and light duty trucks.

   a. When determining technical feasibility, what consideration is given to economic feasibility from the standpoint of the consumer? For example, what is the relationship between economic feasibility as that term is used and cost-effectiveness from the standpoint of the new car purchaser?

   b. What consideration is given to the financial capability of a given manufacturer to incorporate a technically achievable technology within its new car product line? And how is such capability influenced by product year considerations? In other words, what are the time constraints on how fast a given manufacturer can turn over its product line?

3. What is the added cost if any of the various technological improvements such as variable valve control, fuel injection, etc., to the consumer in terms of frequency and cost of repairs?

4. Internationally, what correlation is there between CAFE standards in Japan and Europe and per capita fuel consumption?

5. What effect has existing CAFE standards in the United States had on per capita fuel consumption? And on vehicle miles driven?

6. Would you agree that analyses of the feasibility of meeting any specified automotive fuel economy must of necessity assume retention of the emission standards contained in the 1990 Clean Air Act Amendments?

7. There are press reports of experimental cars capable of achieving over 50 miles per gallon. Why are the constraints on making such cars available to consumers?

UAW RESPONSES TO QUESTIONS POSED BY SENATOR WALLOP

1. We would agree that the nation should be taking all reasonable steps to promote domestic energy production, but the key here is how "reasonable" is defined.

   For example, some people would consider certain tax incentives reasonable. Others would not. Some people believe we should take all steps necessary to develop nuclear power as an alternative to other sources. Others, the UAW included, would not advocate that unless we are satisfied with measures that assure the safety of nuclear energy.

   We believe the federal government should have an energy policy that fosters efficiency, renewable energy resources, energy conservation and promotion of domestic energy production but that policy must be consistent with other national objectives. The policy should be balanced taking into consideration all competing and conflicting interests.

2a. Economic feasibility, including the impact on employment and the capacity of the manufacturers to achieve certain objectives, must be given consideration in determining technical feasibility. Technical feasibility is too narrow a basis for developing CAFE standards. There are too many factors involved, including, among others, employment, capacity of the producers, market forces, consumer choice. Technically, certain objectives can be reached; that really doesn't mean that such objectives can be reached in the real world.

2b. In addition, in determining what increases in CAFE are feasible, the UAW believes that consideration should be given to whether the manufacturers have the financial resources needed to develop and incorporate new technologies into their new car and truck product lines. The auto industry is currently experiencing a sharp downturn. This has already strained the finances of the domestic automakers. If Congress were to legislate overly strict CAFE requirements which required the companies to devote inordinately large sums to the development and implementation of new fuel economy technologies, this could be disastrous for the financial health of the domestic manufacturers. The UAW is concerned that this could jeopardize the jobs of thousands of workers employed in these companies.

It is unrealistic to expect great improvement in CAFE performance by 1996. Too many decisions are already in place, and making drastic changes to achieve early objectives would cause dislocation in the industry with attendant job loss. It is better to focus on later years if CAFE standards are going to require development of new technology and then application to reach the standards.

3. The UAW does not have the technical expertise to respond to this question.

4. Per capita fuel consumption is lower in Japan and Europe than in the United States. But there are other factors which may account for this, such as the higher cost of gas in Japan and Europe, the shorter driving distances for much of the population, and the greater availability of mass transit facilities.

5. The CAFE standards, in our judgment, have helped to improve the fuel efficiency of the fleet of automobiles on the nation's roads and highways. This in turn has had a positive impact on per capita fuel consumption, although we cannot quantify the amount.

6. Absolutely, because the emissions standards and other provisions imposed by the 1990 Act will have an impact on what can be achieved in the way of fuel efficiency. If the emissions standards were not retained or were significantly modified, that obviously would have an effect on what can be achieved.

7. The manufacturers can produce 50 mpg vehicles. The problem would be selling such vehicles because they would be very small, not the type that most consumers

want to buy. Much of the improvement in fuel economy has been attributable to reduction in weight. Most of the weight that can safely be removed from motor vehicles has been removed. Further improvements will depend more upon technology which may drive up prices for consumers. At the present time, cars that achieve 50 mpg are not family-sized vehicles, and they do not perform as well as larger cars that generally are less fuel efficient. Consumer demands in terms of price, performance, comfort, safety and capacity militate against fuel efficient vehicles in the above - 50 mpg range. If the auto companies were to shift production over to these types of cars, and consumers failed to purchase them, the net result could be widespread dislocation in the auto industry and the loss of jobs for thousands of workers.

opeiu494

Questions for Dr. Daniel A. Lashof, NRDC, from
Senator Malcolm Wallop (R-WY)
CAFE provisions of S. 341, the Energy Security Act of 1991
February 28, 1991

Panel II (as reconstituted)

1. The Administration has estimated that energy demand and supply initiatives can achieve comparable benefits under a balanced national energy strategy. By the year 2000, oil consumption can be reduced by 1.3 million barrels per day and domestic oil production can be increased by 1.8 million barrels per day. By the year 2010, oil consumption can be reduced by 3.4 million barrels per day and domestic oil production can be increased by 3.8 million barrels per day.

   Would you agree that it is not enough to foster energy efficiency and the use of renewable energy resources, but we also must develop an energy policy which takes all reasonable steps to promote domestic energy production?

2. The current CAFE debate centers on defining the maximum feasible average fuel economy for automobiles and light duty trucks.

   a. When determining technical feasibility, what consideration is given to economic feasibility from the standpoint of the consumer? For example, what is the relationship between economic feasibility as that term is used and cost-effectiveness from the standpoint of the new car purchaser?

   b. What consideration is given to the financial capability of a given manufacturer to incorporate a technically achievable technology within its new car product line? And how is such capability influenced by product year considerations? In other words, what are the time constraints on how fast a given manufacturer can turn over its product line?

3. What is the added cost if any of the various technological improvements such as variable valve control, fuel injection, etc., to the consumer in terms of frequency and cost of repairs?

4. Internationally, what correlation is there between CAFE standards in Japan and Europe and per capita fuel consumption?

5. What effect has existing CAFE standards in the United States had on per capita fuel consumption? And on vehicle miles driven?

6. Would you agree that analyses of the feasibility of meeting any specified automotive fuel economy must of necessity assume retention of the emission standards contained in the 1990 Clean Air Act Amendments?

7. There are press reports of experimental cars capable of achieving over 50 miles per gallon. Why are the constraints on making such cars available to consumers?

NATURAL RESOURCES DEFENSE COUNCIL
1350 New York Avenue, N.W.
Suite 300
Washington, DC 20005

Answers to questions from Senator Malcolm Wallop, to
Dr. Daniel A. Lashof, Natural Resources Defense Council

1. Increased energy services can be provided by increasing energy efficiency, increasing production, or both. When choosing among the various options our national energy strategy should select the best buys first. The Administration's strategy and S.341 fail to do this. NRDC's analysis cited in my testimony shows that energy efficiency can supply at least 3 million barrels per day of oil equivalent by 2000 and 7.5 million barrels per day in 2010 [these savings are from oil and gas; substantial additional electricity savings are also possible]. Some measures to promote additional domestic energy production may be reasonable if they are among the least costly options for the nation as a whole. Risking the incalculable value of the Arctic National Wildlife Refuge can not be considered "reasonable."

2a] All measures that are cost-effective from the point of view of the consumer should be considered economically feasible. Additional measures that may not appear cost-effective to the individual consumer, but are beneficial to society as a whole because they reduce environmental and energy security externalities should also be considered economically feasible. Thus, economic feasibility should consider, at a minimum, the added cost of the fuel-economy-improving parts, and the fuel cost and externality savings over the statistical life of the automobile, which is approximately 10 years. A real discount rate appropriate for social decisions, which is about 3% per year[1], and projections of future gasoline prices should be employed. Applying this definition of economic feasibility, it is cost effective to raise the average fuel economy of new cars sold in the United States to at least 44 miles per gallon by the year 2000, according to a recent study by the American Counsel for an Energy-Efficient Economy[ACEEE][2]. In short, the cost of raising the milage of the average car sold in America is less expensive than paying for the additional gasoline that would be burned by leaving the car at the lower fuel economy of 28.5 mpg on average that we have today. The ACEEE study does not assume vehicle downsizing or reductions in vehicle performance. Instead, increases in fuel economy are achieved by improvements in aerodynamics, automotive materials, transmission design, and engine efficiency. A list of some of these technologies is given in Table 1. The ACEEE study is highly conservative in its estimate of cost effective fuel economy improvements in that it uses a 7% discount rate rather than 3%, does not consider externalities, and only considers currently in production and proven technologies. Using other assumptions and as new technologies are developed, it will become cost effective to raise the fuel economy of cars beyond 44 mpg.

2b] The time constraint for a manufacturer to introduce fuel economy improvements in new car models depends on the specific technology being introduced. Minor changes can be phased in as quickly as one to two model years. Items such as electric radiator fans and high efficiency accessories fall into this camp. At the second level of complexity, new automobiles can be designed and introduced within as little as 3 to 5 years. Here, a full line of fuel saving technologies can be deployed, such as front wheel drive, aerodynamic improvements, and engine and transmission efficiency improvements. At the third level of complexity, innovations still requiring engineering development typically require a minimum of 5 to 10 years. Electric vehicles and 2-stroke engines fall into this group. Both the 2-stroke and the GM electric car are expected to be on the market by 1994.

3. A list of technologies that can be employed to raise the national new car fleet fuel economy average by over 50% is shown in Table 1. Most of these technologies have been introduced, and are now being sold in limited production volumes. Consequently, a service record is available. To our knowledge, none of these technologies has been identified as requiring special or unusual servicing.

4. There are no mandatory CAFE standards in Japan and Europe. However, many foreign free world industrialized countries employ large gasoline taxes, ranging from $1.44 per gallon in Japan to $3.56 per gallon in Italy[3]. In general such countries have higher fleet-wide fuel economies and much lower gasoline consumption per capita.

5. Since 1975 the average fuel consumption per passenger car has improved by approximately 40%[4]. During this same time frame, the average annual miles traveled per passenger car has increased by only 4%. Consequently, CAFE standards appear to have been highly effective at reducing fuel consumption of cars, while over the same time frame, improvements in fuel economy do not appear to significantly increase driving by the individual car owner.

Between 1975 and the present the number of registered passenger cars has increased by more than 30%. This increase in new car registrations has offset much of the fuel savings realized by passenger car fuel economy improvements. Fuel consumption by passenger cars decreased by approximately 6% between 1975 and the present. Additionally, the light truck market has grown significantly since 1975, and contributes further to total fuel consumption.

6. Yes. There is no reason to believe that there is a tradeoff between fuel economy improvements and reductions in emissions of criteria pollutants[5]. Many of the technologies used to improve fuel economy would make it easier to meet the new emissions standards.

7. A public opinion poll recently conducted by Bush-Quayle '88 pollster Dr. Vincent Breglio [6] found that 84 percent of all Americans favor federal fuel economy standards for auto companies

requiring that cars, on average get 40 mpg by the year 2000, and 89 percent said they would still favor a 40 mpg standard if the new car would cost $500 more. The question is then why don't car manufacturers invest $500 in fuel economy equipment. The answer appears to be that because fuel costs are a small fraction of the cost of owning and operating a car, manufacturers believe that there are less expensive or less uncertain ways to increase market share, such as styling and advertising.

Footnotes:

1. Comments of the Natural Resources Defense Council on the U.S. Department of Energy Advanced Notice of Proposed Rulemaking Regarding Energy Conservation Standards for 9 Types of Consumer Products, Docket #CE-RM-90-201, December 10, 1990.
2. Testimony of Marc Ledbetter and John DeCicco, American Council for an Energy-Efficient Economy, before the Consumer Subcommittee, Senate Committee on Commerce, Science, and Transportation, February 21, 1991.
3. Worldwatch Paper 100, Worldwatch Institute.
4. Facts and Figures, Motor Vehicle Manufacturers Association of the United States.
5. Chris J. Calwell, The Near-Term Potential for Simultaneous Improvements in the Fuel Efficiency and Emissions of U.S. Automobiles. Master's Project Submitted in Partial Satisfaction of the Requirements for the Degree Master of Arts in the Energy and Resources Group of the University of California, Berkeley, 1989.
6. America at the Crossroads: A National Energy Strategy Poll, Dr. Vincent Breglio, Research/Strategy/Management, inc. Lanham, Maryland.

TABLE 1
TECHNOLOGIES FOR IMPROVING THE FUEL ECONOMY OF AUTOMOBILES

TECHNOLOGY
1. Intake valve control
2. Roller cam followers
3. Multi-point fuel injection
4. Four valves per cylinder
5. Aerodynamic improvements
6. Torque converter lockup
7. Electronic transmission control
8. Overhead cam engines
9. Front wheel drive
10. Continuously variable transmission
11. Improved accessories
12. Engine friction reduction
13. Low rolling resistance tires
14. High strength, light weight materials
15. Five speed automatic transmission

CHRYSLER
MOTORS

R R Boltz
Vice President
Product Strategy and
Regulatory Affairs

March 20, 1991

Mr. Karl Hausker
Committee on Energy and Natural Resources
United States Senate
Washington, DC 20510-6180

Dear Mr. Hausker,

Attached is our response to questions from the February 28, 1991 hearing on S.341, Title XI. Also attached for the record of this hearing are Chrysler's statements on S.279 and S.1224.

Energy conservation issues are important to Chrysler. We are working on new technologies that will improve the fuel efficiency of our passenger cars and light trucks. However, technology alone will not deliver quantum leaps in CAFE. Because CAFE is ultimately dependent on consumer demand, vehicle size mix, and fuel price.

In general, we support the concepts outlined in Title XI of S.341. Chrysler remains willing to assist the Committee staff in developing the key elements of this bill.

Best regards,

Attachments
cc: The Honorable J. Bennett Johnston
The Honorable Malcolm Wallop

Chrysler Corporation
12000 Chrysler Drive
Highland Park MI 48288-0857

RESPONSES TO QUESTIONS FROM S.341 HEARING--2/28/91

Question A. WHAT DO YOU THINK ABOUT VAFE?

Response: As shown on the attached chart, measured fuel economy does not correlate with interior volume. Cars with the same interior volume get vastly different fuel economy. Averaging the data enhances the analytical appeal of the VAFE approach--but it simply does not work at the micro level.

Any system that assumes the Rolls Royce Corniche and GEO Metro are the same size is inherently frail. The VAFE approach does this. The interior volume method is barely adequate as a consumer information aid. And it is inadequate as the basis for regulation.

VAFE also is subject to gamesmanship. An interior volume increase of 10 cubic feet or more is achievable by increasing headroom six inches. The actual utility of the vehicle will not improve.

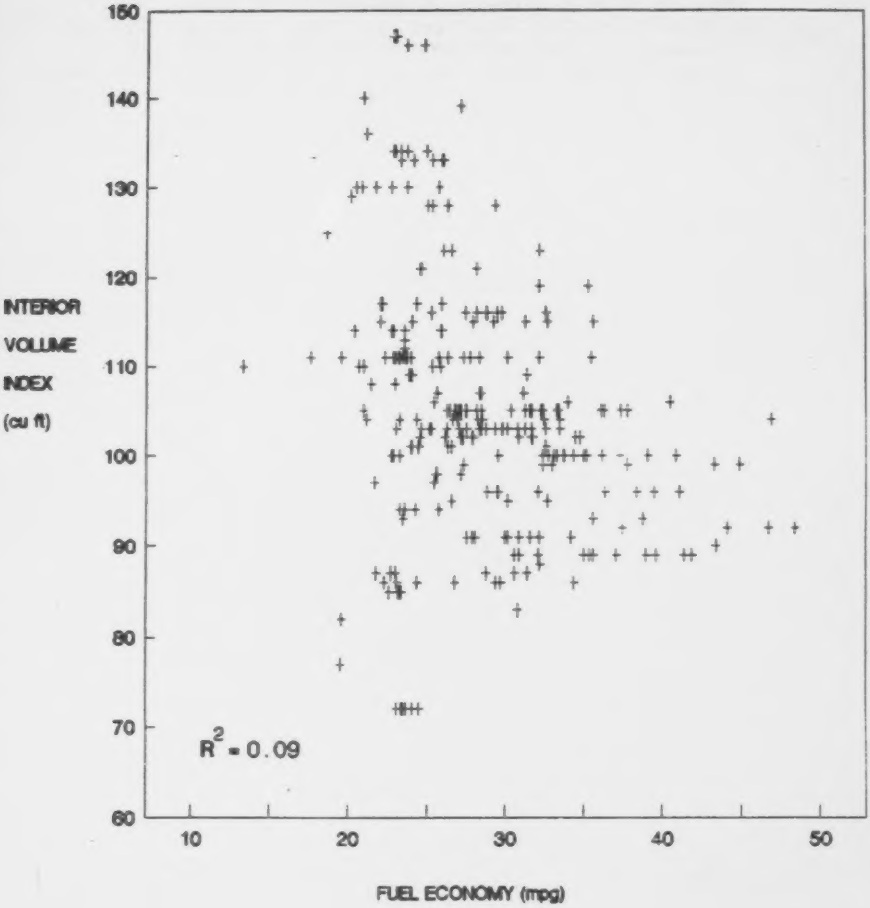
Furthermore, we can not envision how the VAFE approach will apply to light trucks. For example, there is no analog for the volume of a pick-up truck. So, VAFE does not work for light trucks.

Finally, the VAFE approach may not result in improvements to new vehicle fleet average fuel economy. If manufacturers abandon production of small cars and focus on large cars, new car fleet average fuel economy will decline rather than increase. VAFE will not achieve the goals of S.341. And if these goals are unimportant, then why change anything?

We continue to favor the percentage increase CAFE approach contemplated in Title XI. We urge the Committee to reject the VAFE/size class approach.

INTERIOR VOLUME VS MPG

EPA DATA FOR 1990 PASS CARS



Certification & Regulatory Programs
ivivsmpg-tbg 3/18/91

Question B. WHAT ARE YOUR ESTIMATES FOR THE ENERGY SAVINGS OF THE BRYAN BILL?

Response: Chrysler has not estimated the fuel savings that could result from the Bryan Bill. Estimates of this type are exceptionally difficult to make. These estimates require a huge number of assumptions about consumer preferences and behavior, gasoline prices, the rate of turnover of the existing fleet, vehicle miles travelled, and other matters--including the economic practicability and technological feasibility of meeting the standards proposed in the Bryan bill. And all of these assumptions must be projected far into the future.

As a result, it comes as no surprise that these estimates vary widely. The only observation we can make, at this time, is that the estimates offered to date appear to reflect the biases of the estimator.

CHRYSLER RESPONSE TO ADDITIONAL QUESTION FROM SENATOR MURKOWSKI RE HEARING ON TITLE XI, SUBTITLE A OF S.341, NATIONAL ENERGY SECURITY ACT

Question: IT HAS BEEN ARGUED THAT INCREASED CAFE STANDARDS WILL RESULT IN A SIGNIFICANT DOWNSIZING OF THE FLEET. AT WHAT POINT WOULD YOUR LIABILITY FOR ACCIDENTS BECOME COMPROMISED?

Response: Downsizing of the new car fleet certainly raises safety concerns, but the degree of compromise to a manufacturer's liability is not clear. Liability may not be compromised even if new CAFE standards result in downsizing of the new car fleet.

New vehicles comply with stringent safety standards established by NHTSA, and are designed using sound engineering practices. By this definition, all new cars are safe regardless of size.

Nonetheless, differences in injury and fatality rates bear some relation to vehicle size, based on an examination of NHTSA and Highway Loss Data Institute statistics. Therefore, concerns about the safety implications of further downsizing appear justified.

CHRYSLER RESPONSE TO QUESTIONS FROM SENATOR MALCOLM WALLOP RE HEARING ON TITLE XI, SUBTITLE A OF S.341, NATIONAL ENERGY SECURITY ACT, February 28, 1991

Question 1: THE ADMINISTRATION HAS ESTIMATED THAT ENERGY DEMAND AND SUPPLY INITIATIVES CAN ACHIEVE COMPARABLE BENEFITS UNDER A BALANCED NATIONAL ENERGY STRATEGY. BY THE YEAR 2000, OIL CONSUMPTION CAN BE REDUCED BY 1.3 MILLION BARRELS PER DAY AND DOMESTIC OIL PRODUCTION CAN BE INCREASED BY 3.8 MILLION BARRELS PER DAY.

WOULD YOU AGREE THAT IT IS NOT ENOUGH TO FOSTER ENERGY EFFICIENCY AND THE USE OF RENEWABLE ENERGY RESOURCES, BUT WE ALSO MUST DEVELOP AN ENERGY POLICY WHICH TAKES ALL REASONABLE STEPS TO PROMOTE DOMESTIC ENERGY PRODUCTION?

Response: Yes, Chrysler agrees that reasonable steps to promote domestic energy production are necessary to achieve the goals of S.341. The definition of "reasonable" must include environmental protection and economic viability.

As we understand the purpose of S.341, reducing the Nation's dependence on imported oil is the primary goal. Ignoring the debate about whether or not reducing dependence on imported oil is the best way to achieve energy security, the goal of S.341 will not be achieved by conservation measures alone. Or by fostering the use of alternative fuels alone. Or, for that matter, by promoting domestic energy production alone.

Each policy instrument plays a role in achieving the goal of S.341. Plus one other--energy pricing. An effective energy policy will address all four elements, including energy pricing.

In addition, the balance among all four elements should be set in a manner that minimizes the total cost to the American public.

Question 2: THE CURRENT CAFE DEBATE CENTERS ON DEFINING THE MAXIMUM FEASIBLE AVERAGE FUEL ECONOMY FOR AUTOMOBILES AND LIGHT DUTY TRUCKS.

2a. WHEN DETERMINING TECHNICAL FEASIBILITY, WHAT CONSIDERATION IS GIVEN TO ECONOMIC FEASIBILITY FROM THE STANDPOINT OF THE CONSUMER? FOR EXAMPLE, WHAT IS THE RELATIONSHIP BETWEEN ECONOMIC FEASIBILITY AT THAT TERM IS USED AND COST-EFFECTIVENESS FROM THE STANDPOINT OF THE NEW CAR PURCHASER?

Response: 2a We should be careful to distinguish technological feasibility from economic practicability. It may be technologically feasible to put 100,000 people on the moon. It is not economically practicable presently.

From a consumer's viewpoint, technology first must be affordable; and, second, economic. In other words, fuel efficient technologies must fit the consumer's pocketbooks, and result in savings at least equal to the total cost of the technology during the period of ownership. Here again, the price of fuel plays a role.

Question 2b. WHAT CONSIDERATION IS GIVEN TO THE FINANCIAL CAPABILITY OF A GIVEN MANUFACTURER TO INCORPORATE A TECHNICALLY ACHIEVABLE TECHNOLOGY WITHIN ITS NEW CAR PRODUCT LINE? AND HOW IS SUCH CAPABILITY INFLUENCED BY PRODUCT YEAR CONSIDERATIONS? IN OTHER WORDS, WHAT ARE THE TIME CONSTRAINTS ON HOW FAST A GIVEN MANUFACTURER CAN TURN OVER ITS PRODUCT LINE?

Response: 2b Competitive pressures tend to accelerate the introduction of fuel efficient technologies, provided these technologies are affordable and economic. High cost solutions to low cost problems meet little success in a competitive market.

Successful manufacturers generally attempt to solve problems for consumers at the lowest possible cost--subject to the very real constraints in applying available human and financial resources.

The approach to solving consumer problems, and the time frame of resolution, varies for each manufacturer. The availability of technology, the breadth of the product lines offered, and the resources available to a manufacturer all play a role--often interrelated. We believe full-line manufacturers face greater difficulties in diffusing new technologies than makers with focused product lines. And the level of competing claims on resources--such as simultaneous demands for exhaust emissions, safety and fuel economy improvements--complicates these difficulties for full line manufacturers.

Regulatory policies rarely address these issues. And almost never address the differential capabilities of individual manufacturers.

Question 3: WHAT IS THE ADDED COST IF ANY OF THE VARIOUS TECHNOLOGICAL IMPROVEMENTS SUCH AS VARIABLE VALVE CONTROL, FUEL INJECTION, ETC., TO THE CONSUMER IN TERMS OF FREQUENCY AND COST OF REPAIRS?

Response: If technological improvements are introduced in an orderly manner, the frequency and cost of repairs will not be compromised.

Forcing technological breakthroughs on a rigid timetable, however, is not an orderly process. Technology forcing creates not only the risk of increased frequency and cost of repairs. It creates the risk of customer dissatisfaction, resulting in lost opportunity for repeat sales in the future.

Question 4: INTERNATIONALLY, WHAT CORRELATION IS THERE BETWEEN CAFE STANDARDS IN JAPAN AND EUROPE AND PER CAPITA FUEL CONSUMPTION?

Response: There is no correlation between CAFE standards in Europe and Japan, and per capita fuel consumption--because CAFE standards do not exist in Europe and Japan.

Some countries provide voluntary fuel efficiency guidelines. Others require manufacturers to provide consumers with fuel efficiency information. No country other than the United States imposes CAFE standards.

Per capita fuel consumption does correlate inversely to fuel prices. Consumption per capita in industrialized countries is high where fuel prices are low, and consumption is low where fuel prices are high.

In general, other countries employ a price mechanism--gasoline taxes--to encourage conservation, rather than impose rigid CAFE regulations.

Question 5. WHAT EFFECT HAS EXISTING CAFE STANDARDS IN THE UNITED STATES HAD ON PER CAPITA FUEL CONSUMPTION? AND ON VEHICLE MILES DRIVEN?

Response: Existing CAFE standards have no direct effect on fuel consumption. The benefits of higher fuel economy are offset by increased driving. And CAFE does nothing to encourage conservation by the American public.

The most important factor affecting per capita fuel consumption and vehicle miles driven appears to be the price of fuel. When fuel prices rose during the 1970s, customers bought more economical cars and drove fewer miles. Now, fuel costs have fallen. Consumers are less concerned about fuel economy when they buy a car, and they are driving more.

Question 6. WOULD YOU AGREE THAT ANALYSES OF THE FEASIBILITY OF MEETING A SPECIFIED AUTOMOTIVE FUEL ECONOMY MUST OF NECESSITY ASSUME RETENTION OF THE EMISSION STANDARDS CONTAINED IN THE 1990 CLEAN AIR ACT AMENDMENTS? TO DO OTHERWISE WOULD LEAD TO OVERLY OPTIMISTIC ESTIMATES OF POTENTIAL FUEL EFFICIENCY GAINS.

a. WHAT ASSUMPTION DID YOU MAKE WITH REGARD TO THE REQUIREMENTS IN 1990 CLEAN AIR ACT AMENDMENTS? IF I AM NOT MISTAKEN YOUR INITIAL ANALYSES WERE PERFORMED PRIOR TO ENACTMENT OF THE 1990 AMENDMENTS.

b. REPORTEDLY ELECTRICALLY HEATED CATALYSTS MAY BE NEEDED TO MEET THE MORE STRINGENT HC AND CO STANDARDS. IF SO, THE ACCOMPANYING WEIGHT INCREASES, TOGETHER WITH OTHER ENGINE MODIFICATIONS ARE ESTIMATED BY SOME EXPERTS TO REDUCE FUEL ECONOMY BY 7 PERCENT. WOULD YOU COMMENT?

c. ANOTHER CONCERN IS LIMITATIONS ON THE USE OF CERTAIN ENGINE TECHNOLOGIES. FOR EXAMPLE, LEAN-BURN GASOLINE TECHNOLOGIES WHICH ARE UTILIZED IN EUROPE BY COMPANIES SUCH AS TOYOTA ARE CAPABLE OF ACHIEVING A 10 PERCENT INCREASE IN FUEL ECONOMY OVER COMPARABLE GASOLINE ENGINE TECHNOLOGIES. HOWEVER, I UNDERSTAND THAT WITH SUCH TECHNOLOGY IT IS VERY DIFFICULT TO CONTROL NITROGEN OXIDES EMISSIONS TO THE LEVELS REQUIRED BY THE TIER II EMISSIONS STANDARDS IN THE 1990 AMENDMENTS. WOULD THE CAA PRECLUDE USE OF SUCH PROMISING ENERGY EFFICIENCY TECHNOLOGIES IN THE UNITED STATES TO MEET CAFE STANDARDS?

d. IF SO, IS IT NOT UNREALISTIC TO BASE U.S. EFFICIENCY STANDARDS ON EUROPEAN EXPERIIENCE WITH SUCH TECHNOLOGIES?

Response 6 Chrysler agrees that any analysis of fuel economy capability must include other regulatory requirements, including CFC's, emissions and safety.

Response 6a Chrysler's prepared its initial assessments assuming current emissions requirement remained in effect. We are developing an assessment of the fuel economy impact resulting from the 1990 CAA amendments.

Response 6b Chrysler is investigating electrically heated catalyst technology as one means of complying with more stringent HC and CO standards included in the 1990 Clean Air Act. We agree that the additional hardware required for this system will add weight and reduce the fuel economy of a typical vehicle.

Response 6c The only production technology capable of meeting the current U.S. NOx standard is the three-way catalyst. Lean-burn engine operation defeats the capability of three-way catalysts to reduce NOx.

Research to develop lean NOx catalysts continues, but it is too early to project success. The more stringent U.S. NOx standards enacted in the CAA could further delay the introduction of leanburn technology.

Response 6d Yes, it is unrealistic to base fuel efficiency standards on technologies that are not currently in production on cars built for sale in the United States.

Further, projections of the fuel economy benefit and consumer acceptance of technologies not in production are frequently overly optimistic.

Question 7. THERE ARE PRESS REPORTS OF EXPERIMENTAL CARS CAPABLE OF ACHIEVING OVER 50 MILES PER GALLON. WHY ARE THE CONSTRAINTS ON MAKING SUCH CARS AVAILABLE TO CONSUMERS?

Response 7 Vehicles that achieve 50 mpg are available to consumers today, but they do not satisfy the needs of many car buyers in America. Such vehicles accounted for less than three percent of vehicle sales in 1990.

Press reports of experimental fuel economy vehicles focus on high fuel economy ratings, but do not mention the compromises made to achieve those ratings. Many experimental vehicles and concept cars do not meet U.S. safety and emission standards. And they frequently employ high cost experimental technology that is not suitable for high volume production.

Question 8. ONE OF THE OBJECTIVES OF THE ADMINISTRATION'S NATIONAL ENERGY STRATEGY AND S.341 IS TO FOSTER THE USE OF ALTERNATIVE FUELS SUCH AS NATURAL GAS IN AUTOMOBILES. YET COMPRESSED NATURAL GAS BURNS AT EXTREMELY HIGH TEMPERATURES, WHICH LEADS TO DIFFICULTY IN CONTROLLING NITROGEN OXIDE EMISSIONS.

a. DOES THE CLEAN AIR ACT CONSTRAIN THE FEASIBILITY OF USE OF CNG AS AN ALTERNATIVE TRANSPORTATION FUEL?

b. WOULD SIMILAR CONSTRAINTS ALSO APPLY TO FLEXIBLE FUEL VEHICLES WHICH ARE CAPABLE OF USING GASOLINE OR METHANOL?

Response 8a The emission standards included in the Clean Air Act may preclude the sale of vehicles capable of using CNG. With CNG fuel, methane and NOX emissions are higher than with gasoline. Further development will be required to determine the feasibility of emissions compliance with CNG fuel.

Response 8b Chrysler believes the emission requirements of the 1990 Clean Air Act will affect our ability to certify flexible fuel vehicles capable of using either gasoline or a methanol/gasoline mixture. However, we are pursuing on-going development programs to resolve these difficulties.

Question 9. EARLIER DOE ESTIMATED THAT A 0.7 GRAMS PER MILE NITROGEN OXIDE STANDARD COULD INCREASE OIL CONSUMPTION IN 2010 BY 250,000 BARRELS PER DAY AND COULD RESTRICT OR ELIMINATE THE USE OF DIESEL ENGINES IN LIGHT DUTY TRUCKS. BY COMPARISON, A STANDARD OF 0.4 GRAMS PER MILE STANDARD WOULD INCREASE OIL CONSUMPTION BY ONLY 50,000 BARRELS PER DAY. WOULD YOU COMMENT?

Response 9 Chrysler does not possess the assumptions or analysis the DOE estimates are based upon. We cannot comment on the difference in projected oil consumption.

RECORD STATEMENT OF CHRYSLER CORPORATION

Presented to the Senate Consumer Subcommittee of the
Committee on Commerce, Science and Transportation
September 7, 1989

Thank you and good morning. I am Ronald Boltz, Vice President of Advance Product and Operations Planning for Chrysler Motors Corporation.

Chrysler Motors appreciates the opportunity to express our views concerning Senate Bill 1224, which would amend and extend the Corporate Average Fuel Economy requirements included in the Motor Vehicle Information and Cost Savings Act of 1975 (MVICS). Our views concerning the efficacy of CAFE regulations, and our experience in meeting these requirements, were summarized by Mr. Robert G. Liberatore on May 2, 1989. Therefore, my remarks this morning will be directed primarily to the revisions proposed in S.1224.

CAFE standards are an indirect and incomplete approach, at best, to achieving National energy conservation goals. Any CAFE scheme contains the potential, latent or otherwise, for market distortions and competitive disadvantage. If CAFE revisions must be considered, then these revisions should be made consistent with the following policy objectives:

- Require all manufacturers to improve fuel economy, to equalize the burden of achieving CAFE improvements.
- Minimize the inherent potential for market distortion and competitive disadvantage.

Chrysler believes the percentage increase approach in combination with floors and ceilings, offers in concept the best potential to satisfy these objectives, but the levels of improvement proposed are not practical. Furthermore, the base year should be adjusted to the most recent data available at enactment, and provisions to expand fuel economy testing are believed to be burdensome, costly and without demonstrable benefits.

Chrysler's primary concerns relate to the percentage improvements proposed for 1995 and 2001. Specifically, the 20% improvement for 1995 and 40% improvement for 2001 cannot be achieved without substantial downsizing of product offerings.

We believe the percentage increases specified in S.1224 were based, at least in part, upon Office of Technology Assessment projections that suggest a 1995 U.S. fleet average fuel economy improvement potential of 17.3%, by diffusing existing technology throughout the fleet.

Mr. Steve Plotkin of OTA has made it clear that these projections do not reflect the capabilities of individual manufacturers - - the projections apply only to the U.S. passenger car fleet as a whole and are based on 1987 model fleet mix and performance levels.

Chrysler has developed a projection of CAFE capability for 1995 using an approach similar to that employed by OTA. The results are summarized on the facing page, indicating a potential improvement of 7.7% compared to Chrysler's 1989 EPA status (February 1989). There are two primary reasons why Chrysler and OTA projections differ:

1. The OTA has assumed diffusion of technology across the U.S. fleet that Chrysler already employs at a high rate. For example, in 1989, Chrysler's passenger car offerings are 100% front wheel drive. Obviously, Chrysler cannot further improve CAFE by expanding use of this technology as OTA suggests for the fleet as a whole.

2. We believe the benefits of the technologies listed by OTA either have been overstated or counted twice in the OTA analysis. For example, front-wheel drive does not improve fuel economy per se. Rather, it leads to package efficiencies that provide weight reduction benefits of about one test weight class, improving fuel efficiency by about 1%, not 12% as stated by OTA.

It should be noted that the 1995 7.7% CAFE improvement potential, compared to 1989 results, assumes market conditions are identical to those that prevailed during the 1989 model year, a remote prospect. Although long-range forecasts of market conditions are highly uncertain, extrapolation of present trends indicates the car market is moving in a direction that will be detrimental to CAFE improvement. Buyers appear to be placing a premium on vehicle performance characteristics, and less emphasis on fuel economy. A maturing "baby-boom" population entering their middle years is expected to increase the demand for mid-size and family-sized vehicles.

The net result of these trends is to reduce Chrysler's 1995 CAFE potential to approximately 6.5% from the 7.7% projection at constant mix. Therefore, Chrysler concludes its CAFE potential for 1995 is about 29.5 mpg, consistent with the 29-31 mpg range projected by Ms. Linda Stuntz of DOE in testimony before the Committee on Energy and Commerce in the House of Representatives on July 13, 1989. (It appears that DOE also has discounted the OTA analysis in establishing its CAFE range projections for 1995).

S.1224 also establishes fuel economy improvement goals for light trucks at +20% for 1995 and +40% for 2001, relative to 1988 model results. Chrysler does not understand the basis of these proposed requirements. If these requirements are based upon the OTA analysis, the Committee should recognize that OTA addressed only the passenger car fleet, not light trucks. Projections of passenger car capability do not apply to light trucks, and vice-versa.

Ms. Linda Stuntz of DOE has projected 1995 light truck CAFE capability at 22-23 mpg. Chrysler's internal projections are consistent with the mid-point of that range.

It should also be noted that none of the projections, neither those of OTA, DOE nor Chrysler anticipate changes to existing safety and emissions regulations. Substantial revisions to these regulations, principally amendments to the Clean Air Act, have been proposed by the Administration including a comprehensive alternative fuels program. The proposals are stringent, and are timed to coincide with the CAFE requirements outlined in S.1224, placing an enormous burden on Chrysler's product development resources in general, and its powertrain engineering group in particular.

Although S.1224, as a stand-alone regulatory initiative, has recognized the need for adequate lead time, Chrysler respectfully requests that the Committee consider delaying the effective date of CAFE increases to the 1996 model year. This action will allow a more orderly technological development process, increasing the prospect for cost effective solutions to achieve CAFE improvements without compromising the quality expectations of the American consumer.

With respect to the 40% increase in fuel economy proposed in S.1224 for 2001, Chrysler believes this level of increase lies beyond the limits of both technological and commercial feasibility. Frankly, projections of technological capability into the third millenium are so uncertain that they amount to speculation. Nonetheless, Chrysler's "best guess" (and that's all it is) for 2001 is compared to OTA's projection on the facing page.

Applying an analytical approach similar to that developed by OTA yields an increase in CAFE of 10.9% during 1996-2001, resulting in a cumulative improvement of about 18.6% compared to 1989 without market condition adjustments, and ignoring the effect of potential revisions to safety and emissions regulations. Factoring in adjustments only for the market trends noted earlier yields a net passenger car CAFE improvement capability of approximately 15% compared to 1989 results, or 31.9 mpg for Chrysler. Our best present judgement of the commercial feasibility of a 15% improvement by 2001 suggests a probability no higher than 50%, with at least one chance in three that the ultimate cumulative passenger car improvement adjusted for market factors could be less than 10%, depending on the future course of fuel prices.

To place the implications of a 40% CAFE increase in perspective, please consider the following example:

- A 40% increase above Chrysler's 1988 CAFE result would require achievement of 39.8 mpg for passenger cars by 2001.
- OTA estimated the sales-weighted harmonic average fuel economy of the 1988 fleet by size class, in Committee testimony on May 2, 1989. As noted on the facing page, none of the individual size class averages exceed 38 mpg.
- Using Chrysler's maximum estimate of 18.6% cumulative fuel economy potential through 2001 yields the adjusted size class fuel economies noted in column three.
- The vehicle mix required to achieve a CAFE of 39.8 mpg is shown in column 4 - - 50% mini compact, 30% subcompact and 20% compact.
- Column five provides Chrysler's present vehicle mix by size class - - 11% subcompact, 35% compact, and 54% mid size.

In essence, the example indicates that, using the best technology available to Chrysler, a 40% CAFE improvement would require a substantial downsizing of the Chrysler fleet. One-half of our sales in the United States would have to be vehicles sized similar to the Chevrolet Sprint and Suzuki Forsa, whereas one half of present sales are represented by entries such as Dodge Dynasty, Chrysler New Yorker and Plymouth Acclaim (replacing Reliant). The net result would be to shift 50% of our buyers from midsize vehicles offering 110-119 cu.ft. of interior space to mini compact vehicles offering less than 85 cu.ft. of interior space.

With the price of gasoline projected to remain at approximately $1 per gallon at constant economics for the foreseeable future, there is no basis for the commercial feasibility of such a mix shift. Achievement of the proposed CAFE requirements, for 1995 as well as 2001, would require a major change in consumer behavior that is inconsistent with the market forces we expect will prevail during the 1990's.

Consumer concerns about the safety characteristics of micro cars alone may preclude achievement of a substantial mix for these vehicles even if fuel prices rise. As noted in Mr. Barry Felrice's testimony before the House Committee on Energy and Commerce on July 13, 1989 "any developments in the fuel economy program which require substantial downsizing of the passenger car or light truck fleets would raise safety concerns".

In summary, Chrysler indicated on May 2, 1989 that large increases in fuel economy will require either major technological breakthroughs or significant down-sizing, although more modest gains can be achieved without significant downsizing by diffusing existing technology. We presently believe increases compared to 1989 in the range of 6.5% for 1995 and 10-15% for 2001 are both technologically and commercially feasible. (Furthermore, Chrysler believes a significant proportion of these improvements will occur as the result of competitive forces within the industry, and that revisions to CAFE standards may not be required to ensure their achievement.)

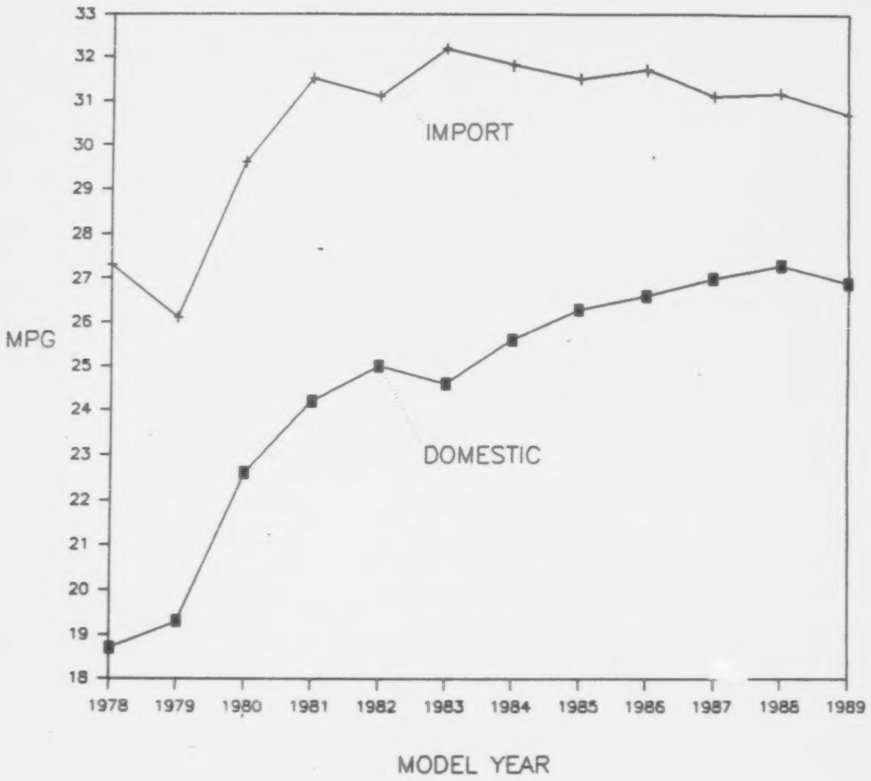
In closing, it should be noted that CAFE is only one element of a broader National energy policy presently being addressed by the Administration. To the extent that energy policy priorities remain to be established, Congressional action on CAFE may be premature.

Thank you.

Attachment 1

Fleet Average Fuel Economy by Source

- Domestic Manufacturers Continue to Improve CAFE
- Import Average Fuel Economy Has Declined Since 1983



Attachment 2

CAFE POLICY ALTERNATIVES

Percentage Increase Option Is Fair and Required to Limit CAFE Erosion Among Import Manufacturers

	DOMESTIC				FOREIGN		
	Fuel Efficiency gal/100 miles		Fleet Avg Fuel Econ mpg		Fleet Avg Fuel Econ mpg		Fuel Efficiency gal/100 miles
1978	5.35		18.7		27.3		3.66
1979			19.3		26.1		
1980			22.6	4.9	29.6		
1981			24.2		31.5		
1982			25.0		31.1		
1983	30%	8.2	24.6		32.2	3.4	11%
1984	Improvement		25.6		31.8		Improvement
1985			26.3		31.5		
1986			26.6	(1.5)	31.7		
1987			27.0		31.1		
1988			27.3		31.2		
1989	3.72		26.9		30.7		3.26

Memo: Share of U.S. Car Market

	Domestic	Foreign
1978	85%	15%
1989	60%	40%

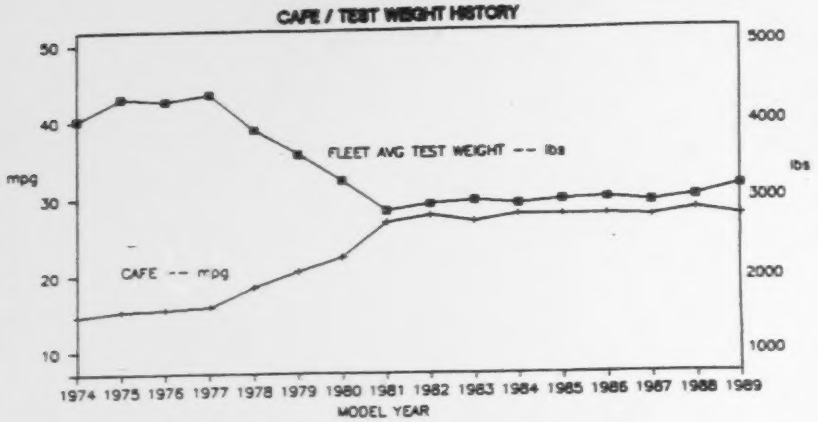
Memo: Estimated Gasoline Saved
1989 vs 1978 Fuel Economy
Billion of Gallons

- Annual @ 1988 volume	1.5B	0.2B
- Cumulative 1978-89	59B	7B

Attachment 3

CHRYSLER MOTORS DOMESTIC FLEET

Further Fuel Economy Improvements are Expected
Even If CAFE Standards are not Changed



CAFE / TEST WEIGHT HISTORY

CHRYSLER MOTORS CAFE / WEIGHT / TFC TRENDS

MODEL YEAR	FLEET AVG TEST WEIGHT lbs	DOMESTIC CAFE mpg	TFC/IW gal/100 mi/1000 lbs
1974	4022	14.7	1.691
1975	4304	15.3	1.519
1976	4262	15.5	1.514
1977	4344	15.9	1.448
1978	3891	18.4	1.397
1979	3578	20.5	1.364
1980	3230	22.3	1.388
1981	2833	26.8	1.317
1982	2912	27.6	1.244
1983	2960	26.9	1.256
1984	2916	27.8	1.234
1985	2974	27.8	1.210
1986	2988	27.8	1.204
1987	2939	27.5	1.237
1988	3008	28.4	1.171
1989	3150	27.7	1.146

DOWNSIZING
+
TECHNOLOGY

TECHNOLOGY
DEVELOPMENT

CORRELATION 97%

ANNUAL RATE OF TFC/IW IMPROVEMENT:

1974 - 81 4.5%
1982 - 89 1.3%

PROJECTION:

1995	3218	28.6	1.087

TECHNOLOGY DIFFUSION 0.9
29.5

APOP C7488A-TBG
28-Aug-89

Statement of Ronald R. Boltz
Vice President, Product Strategy and Regulatory Affairs
Chrysler Corporation

Before the Senate Consumer Subcommittee of the Committee
on Commerce, Science and Transportation
February 21, 1991

Thank you, and good morning. I am Ronald R. Boltz, Vice President, Product Strategy and Regulatory Affairs for Chrysler Corporation. Chrysler appreciates the opportunity to appear before the Consumer Subcommittee to present our views on S.279.

In many respects, S.279 is similar to S.1224 introduced in the 101st session of Congress. Chrysler testified before this Subcommittee on two occasions, May 2, 1989 and September 7, 1989. We believe our prior testimony also applies to S.279. For brevity, we will not repeat these comments today, other than to include them by reference.

We also had the pleasure of meeting with Senator Bryan and Subcommittee staff members in Highland Park, Michigan on July 9, 1990. We discussed Chrysler's forward product plans. And the fuel efficiency improvements associated with these plans.

My message today is simple. Technology exists to improve the fuel efficiency of passenger cars and light trucks. We will continue to apply these technologies and expand their use in our future products. The CAFE effect of these technologies will depend on future consumer acceptance. And fuel prices. And vehicle size mix, as well as the effects of new vehicle safety and emission standards.

S.279 continues the debate about the CAFE potential of existing technologies. The Committee relied on several authorities in setting the 20% and 40% CAFE increases proposed in S.1224. The Committee Report cited the Department of Energy (DOE) and its contractor, EEA among others. EEA recently clarified its study conclusions. Quoting the author, the DOE/EEA analysis--

- o Does not support regulation requiring 20%-40% increase in fuel economy by 1995-2001.
- o Maximum technology scenario is risky and not cost effective to consumers.
- o Does not address the effects of new safety and emission standards.

Nonetheless, S.279 contains the original 20% increase for 1996, and 40% for 2001.

S.279 also states that passenger car fleet average fuel economy between 38 and 45 mpg is possible using existing technologies. Without change in vehicle size or performance. We disagree.

What if every manufacturer produced vehicles equal to the highest fuel economy entry in each size class? The fleet average result for 1990 would still fall far short of 38 mpg. And, the highest fuel economy vehicles in each class represent less than 5% of total U.S. car sales. These vehicles, in some way, do not meet the needs of more than 95% of new car buyers.

The Committee Report on S.1224 also cited a similar analysis by EPA. It said fleet average fuel economy in 1988 would have been 33.9 mpg if all cars in each weight class were equal to the highest fuel economy entry in that class. Again, far short of the 38-45 mpg cited in S.279.

And, the Committee Report also cited a survey of automotive suppliers-- but, none ever testified at a public hearing. The Subcommittee should hear their views directly. Many steel, rubber and other suppliers are opposed to S.279.

S.279 requires a passenger car fleet average fuel economy increase of about 12 mpg during the next ten years. This compares to 4 mpg achieved during the last decade and about 12 mpg during the 15 year period beginning in 1975. The economic consequences of increasing fleet average fuel economy by 12 mpg, again, could be severe. And the safety consequences of reducing weight by 1000 pounds, again, remains a concern.

I raise these points because, at the moment, no one has the facts to support legislation of this importance. And nobody has analysed the financial capability of various manufacturers to support the sustained increase in fuel economy proposed in S.279.

We believe this hearing will highlight the acute lack of reliable information available to Congress about the CAFE issue. The divergence of opinions voiced today will underscore this point. The Subcommittee should accept neither the views of professional political advocates nor those of individual manufacturers. Both groups have a vested interest in the outcome of this legislation.

It makes sense to get all the facts before setting in motion legislation that could potentially harm a major industry. Toward this end, the Department of Transportation recently began a comprehensive study with the National Academy of Sciences. It will provide factual material directly related to this legislation. The study will determine the maximum feasible fuel economy potential, considering technological opportunity, economic practicability and the effect of new vehicle safety and emissions requirements. Initial results will be available by the end of June 1991.

We urge the Subcommittee to review the DOT/NAS conclusions before acting on S.279.
We believe this course of action is prudent, and in the National interest.
We hope you will agree.

Thank you.

Ford

Elliott S. Hall
Vice President-Washington Staff
Governmental Relations

Ford Motor Company
1350 I Street, N.W.
Washington, D.C. 20005

March 22, 1991

The Honorable J. Bennett Johnston
Committee on Energy and Natural Resources
United States Senate
Washington, D.C. 20510

Dear Chairman Johnston:

Thank you for the opportunity to provide additional comments for inclusion in the record, following the February 28, 1991 testimony on S. 341 pertaining to Corporate Average Fuel Economy (CAFE) by Peter J. Pestillo, Vice President Corporate Relations and Diversified Businesses, Ford Motor Company. The attached comments are in answer to the questions of February 14, 1991 and additional questions by other Members provided to us in your letter dated March 5, 1991.

Sincerely,

Elliott S. Hall

cc: Senator Malcom Wallop

ADDITIONAL QUESTIONS FROM SENATOR MURKOWSKI RE HEARING ON TITLE XI, SUBTITLE A, OF S.341, NATIONAL ENERGY SECURITY ACT

QUESTION FOR MR. BOLTZ, MR. PESTILLO, MS. WHITMAN AND MR. REILLY:

- It has been argued that increased CAFE standards will result in a significant downsizing of the fleet. At what point would your liability for accidents become compromised?

Questions for Mr. Peter J. Pestillo, Ford, from
Senator Malcolm Wallop (R-WY)
CAFE provisions of S. 341, the Energy Security Act of 1991
February 28, 1991

QUESTIONS FOR PANEL III

1. The Administration has estimated that energy demand and supply initiatives can achieve comparable benefits under a balanced national energy strategy. By the year 2000, oil consumption can be reduced by 1.3 million barrels per day and domestic oil production can be increased by 1.8 million barrels per day. By the year 2010, oil consumption can be reduced by 3.4 million barrels per day and domestic oil production can be increased by 3.8 million barrels per day.

   Would you agree that it is not enough to foster energy efficiency and the use of renewable energy resources, but we also must develop an energy policy which takes all reasonable steps to promote domestic energy production?

2. The current CAFE debate centers on defining the maximum feasible average fuel economy for automobiles and light duty trucks.

   a. When determining technical feasibility, what consideration is given to economic feasibility from the standpoint of the consumer? For example, what is the relationship between economic feasibility as that term is used and cost-effectiveness from the standpoint of the new car purchaser?

   b. What consideration is given to the financial capability of a given manufacturer to incorporate a technically achievable technology within its new car product line? And how is such capability influenced by product year considerations? In other words, what are the time constraints on how fast a given manufacturer can turn over its product line?

3. What is the added cost if any of the various technological improvements such as variable valve control, fuel injection, etc., to the consumer in terms of frequency and cost of repairs?

4. Internationally, what correlation is there between CAFE standards in Japan and Europe and per capita fuel consumption?

5. What effect has existing CAFE standards in the United States had on per capita fuel consumption? And on vehicle miles driven?

6. Would you agree that analyses of the feasibility of meeting any specified automotive fuel economy must of necessity assume retention of the emission standards contained in the 1990 Clean Air Act Amendments? To do otherwise would lead to overly optimistic estimates of potential fuel efficiency gains.

   a. What assumption did you make with regard to the requirements in 1990 Clean Air Act Amendments? If I am not mistaken your initial analyses were performed prior to enactment of the 1990 Amendments.

   b. Reportedly electrically heated catalysts may be needed to meet the more stringent HC and CO standards. If so, the accompanying weight increases, together with other engine modifications are estimated by some experts to reduce fuel economy by 7 percent. Would you comment?

   c. Another concern is limitations on the use of certain engine technologies. For example, lean-burn gasoline technologies which are utilized in Europe by companies such a Toyoto are capable of achieving a 10 percent increase in fuel economy over comparable gasoline engine technologies. However, I understand that with such technology it is very difficult to control nitrogen oxides emissions to the levels required by the Tier II emissions standards in the 1990 Amendments. Would the CAA preclude use of such promising energy efficiency technologies in the United States to meet CAFE standards?

   d. If so, is it not unrealistic to base U.S. efficiency standards on European experience with such technologies?

7. There are press reports of experimental cars capable of achieving over 50 miles per gallon. Why are the constraints on making such cars available to consumers?

8. One of the objectives of the Administration's National Energy Strategy and S. 341 is to foster the use of alternative fuels such as natural gas in automobiles. Yet compressed natural gas burns at extremely high temperatures which lead to difficulty in controlling nitrogen oxide emissions.

   a. Does the Clean Air Act constrain the feasibility of use of CNG as an alternative transportation fuel?

   b. Would similar constraints also apply to flexible fuel vehicles which are capable of using gasoline or methanol?

9. Earlier DOE estimated that a 0.7 grams per mile nitrogen oxide standard could increase oil consumption in 2010 by 250,000 barrels per day and could restrict or eliminate the use of diesel engines in light duty trucks. By comparison, a standard of 0.4 grams per mile standard would increase oil consumption by only 50,000 barrels per day. Would you comment?

Additional Questions for Mr. Postillo (Ford)

A. You state that safety improvements have helped reduce the highway fatality rate. Hasn't the downsizing of your product line somewhat offset the safety improvements that otherwise could have occurred?

B. You state that new emissions requirements will reduce fuel economy by a half mile per gallon. Is this for all classes of automobiles? Is this an average? If so, please indicate the high and lower end of the range and the actual estimate for each class.

Ford Motor Company Responses to
Senate Energy and Natural Resources Committee
February 28, 1991 Hearing Questions

Standard Setting Procedure

- In general, we agree that the criteria set forward in S.341 -- as well as the criteria that are set forth in the existing law, particularly economic practicability -- are the important factors when considering setting higher CAFE standards. Specifically, we believe it is critical to assess technologies that will be available in the specified periods and capable of being commercialized. It also is important to recognize the impacts of safety, emissions, chlorofluorocarbons and other regulatory requirements on fuel economy capability -- in fact, manufacturers have said they will lose up to 1 mpg in meeting the standards on the books between now and 1995.

- The July 1992 deadline allows DOT to consider the results of the National Academy of Sciences study -- to be completed this summer -- before a final rulemaking.

- Another important standard-setting provision would give DOT discretion to revise the standards if necessary. In this instance, we believe the criteria set forth in the existing law are appropriate factors for DOT to consider. As the last few years have proved, it is very difficult to project market, economic and energy price conditions that have a major impact on consumer purchases and, therefore, the CAFE levels manufacturers can achieve.

- Cost-effectiveness should be added as an explicit criterion because it directly affects the likely acceptance by consumers of any technology. One possible approach would be to require that the additional cost to consumers of any technology be recoverable through fuel savings over some reasonable period of time (e.g., 3-5 years or the average length of time the vehicle is kept by the first owner).

The bill should contain an explicit criterion on auto industry impacts, including employment. The structure of CAFE has very significant competitive impacts -- for example, the original standards had practically no impact on Japanese manufacturers. Also, recessions such as the auto industry is experiencing now affect the amount of money manufacturers have available to invest and how quickly they are able to improve the fuel economy of their fleets.

Because CAFE depends importantly on the mix of cars and trucks that our customers buy, it is very difficult to predict future CAFE levels. Legislatively-set standards afford far less flexibility to account for changes in gasoline price and other market factors. We are very concerned about Congress setting fuel economy standards based on the presently available public information on the potential for increased fuel economy. To date, the studies available are based on hypothetical studies of an assortment of technologies with no substantiation of improvement potential and no acknowledgement of the effect of other regulations or the impact on vehicle affordability.

- Some mechanism needs to be established to handle new manufacturer fleets or mergers among manufacturers to assure that such events do not result in a CAFE "windfall" for any manufacturer(s). DOT could be given authority to handle such situations through rulemaking.

Manufacturer-Specific Standards

- The best way to minimize further market distortions is to give all manufacturers an equal task, as proposed in S.341. It must be recognized that we have been living for 15 years with a CAFE system that is inequitable. The standards set in 1975 required Ford to improve the fuel economy of its fleet by 98 percent. But the standards posed no CAFE task for Honda, a 10 percent task for Nissan, and a 25 percent task for Toyota. The difference in these tasks was not a result of differences in technology, but rather that these manufacturers had fleets that were comprised primarily of small cars. Moreover, while domestic CAFE performance has shown overall progress, the performance of the imports has declined 3-5 mpg from their peak levels./ We strongly urge the Committee not to move away from the equal percentage improvement approach.

- The Committee specifically asked for comments on a market segment approach. This approach is tailor-made to suit certain foreign manufacturers that are expanding into larger car and truck markets, while at the same time forcing across the board investments by those manufacturers already participating in every class. Moreover, all of the potential methods rely on interior volume measures, which offer no "iron clad" way to categorize cars and no way at all to classify light trucks. Also, some have expressed concern that such an approach would encourage entry into larger vehicle segments resulting in decreased energy savings.

Technology Issues

- We expect most fuel efficiency improvements in the time frame addressed in this bill to come from broader application or refinement of technologies already being used on selected models in low volumes today. The CAFE benefits from these technologies are expected to fall far short of the 20 and 40 percent improvement levels included in S.279.

- As we redesign each the 24 car and truck lines in our product cycle -- which takes place over a period of years because of the massive human, technical and financial resources required -- we will be applying many of these and other technologies, such as multi-valve engines and increased use of light-weight materials. Also, we're actively pursuing research on advanced technologies such as two-stroke engines, continuously-variable transmissions, lean-burn engines and advanced diesels, although they are not expected to have a major impact on fuel economy capability by 2001. Further, many of these technologies may not prove feasible with the new emissions standards.

- Consideration of higher CAFE standards must recognize that manufacturers already have implemented major weight reductions that could be accomplished without additional major downsizing and incorporated the technologies that yielded the greatest fuel economy benefit at the least cost. Today's CAFE standards already are forcing the application of technologies that are not cost-beneficial for customers. For example, four-valve engine technology adds $200-$400 to the price of the vehicle for only about a 3 percent fuel economy improvement. At today's gasoline prices it would take 10-20 years for consumers to pay back the initial investment in fuel savings.

- It is essential that market penetration rates be considered in any evaluation of fuel economy potential because many technologies are not applicable across the entire product line (particularly trucks) and because there are likely to be some constraints on the capacity to produce these technologies.

- We're also spending a lot of money and technical effort for very little CAFE benefit. We just spent $1.1 billion to redesign our family-size cars (1992 Crown Victoria and Grand Marquis), incorporating a smaller displacement engine, electronically-controlled transmission and substantially improved aerodynamics. The result was a 1-2 mile-per-gallon fuel economy improvement on those cars compared to the ones they replaced -- but the overall CAFE effect was only 0.2 mpg.

Vehicle Downsizing/Safety

- A particularly critical criterion in S.341 is the principle of maintaining the same size mix and interior volume as today's fleet. Otherwise, there is a risk that certain standards could not be met without additional downsizing, which would adversely affect safety and consumer choice.

- Today's smaller cars meet, or exceed, all applicable federal vehicle safety standards. Manufacturers have stepped up to the challenge of developing technology that has led to increased safety for occupants of smaller vehicles. But, all other things being equal, larger and heavier cars generally have a better safety record than smaller cars. In a vehicle crash, larger vehicles have more structure -- and greater mass -- to help absorb the energy.

- The concern that results from higher CAFE standards that may force additional vehicle downsizing is a legitimate issue -- one that is grounded in the immutable laws of physics.

Even meeting today's CAFE standard has had safety implications. Diane Steed, former Administrator of the National Highway Traffic Safety Administration (NHTSA) has estimated that the downsizing required by CAFE legislation to date has resulted in "an additional 16,000 fatalities than would otherwise have occurred."

In looking to the future, many safety experts have voiced serious concerns over the impact on vehicle size and safety of higher CAFE standards:

- The Insurance Institute for Highway Safety reports that car size is "perhaps the most important single factor when it comes to protecting occupants in crashes."
- Even Consumer Reports has stated that "the lighter and smaller a car is, the more vulnerable its occupants tend to be in a collision."

- Automobile manufacturers have worked hard to continuously improve the safety of their vehicles. Over the past decade, a tremendous expenditure of human, financial and technical resources has been made to equip vehicles with safety devices such as 3-point safety belts, air bags, etc.
- But, as NHTSA's General Curry recently pointed out, "the benefits of these measures to increase the safety of all passenger car occupants...will be compromised -- or lost -- if new legislation should necessitate a significant reduction in the average size and weight of the light duty vehicle fleet."

Effect of Other Government Standards

- Increasingly stringent emissions standards will impact fuel efficiency adversely. These fuel economy penalties must be subtracted from estimates of what might be achieved through vehicle and powertrain efficiency improvements (weight, aerodynamics, engine downsizing, etc.).
- The projected 0.5 mpg CAFE penalty cited in our statement to the Committee is based on compliance with the "Tier I" emissions standards contained in the Clean Air Act Amendments of 1990. The 0.5 mpg loss is an average for cars (0.42 mpg) and trucks (0.56 mpg). The range of fuel economy penalties for cars is 0 to (1.2) mpg; the truck penalties range from 0 to (1.5) mpg. Moreover, there is some concern over whether fuel economy would be further reduced by how the regulations for the new Clan Air Act are written.
- Our estimate does not take into account "Tier II" emissions standards that could take effect in the 2004 model year because we have not identified the engine and control system revisions that will be necessary to achieve these standards. Because there is a strong likelihood that these standards could be required in 2004 -- they are on the books for the late 1990s in California -- we believe DOT should make some provision for the fuel economy impact of meeting these standards.

For example, the stringency of Tier II standards will limit the technologies we might apply in order to improve fuel efficiency.

- Lean burn gasoline technology probably will be ruled out by the 0.2 gpm NO_x standard because NO_x conversion efficiency in the catalytic converter falls off dramatically with lean (high air-to-fuel ratio) mixtures. European experience with this technology is not relevant because European NO_x standards are not as stringent.

- Two-stroke engine technology has not demonstrated the ability to meet the 0.125 gpm NMHC standard, despite significant improvements in recent years.

- Diesel engines also are probably ruled out at 0.2 gpm NO_x.

- Electrically-heated catalysts often are cited as a technology that will be required to meet tighter emissions standards although this technology is still in the developmental stage. Electrically-heated catalyst technology involves the rapid resistive heating of a metallic catalyst substrate, which requires the addition of a second battery and heavy gauge electrical cables, increasing vehicle weight by about 15-30 pounds. Also, significant energy from the engine must be used to recharge the battery between "cold" starts (i.e., any start where the catalyst has cooled below its operating temperature of about 600° F). The combination of the added weight and the additional energy requirements of this system likely will result in a significant fuel economy penalty.

Vehicle Performance

. We do not believe performance should be a design standard because there are not adequate ways to dimension this vehicle characteristic.

. Many of the technologies that improve engine efficiency (e.g., overhead cam and 4-valve per cylinder designs) provide both a horsepower and fuel efficiency improvement. However, in most instances, it is not reasonable or possible to eliminate the additional horsepower and still maintain acceptable acceleration and driveability at low speeds.

. We know first hand the importance of acceptable performance. When we had to reduce emissions on a tight timetable in the early 1980s, performance and driveability became major customer concerns and it took years to overcome this perception of our products. Going fast is not the issue here. Acceleration has safety implications, too, as with passing and the time required to reach highway speed on expressways.

. In any case, we doubt that eliminating performance vehicles, for example, would have much impact on CAFE because these vehicles are low volume niche products. For example, eliminating Ford "performance" models altogether would improve our CAFE by only 0.3 mpg.

Alternative Fuels

- If there is to be a role for alcohol-fueled vehicles, there must be substantial incentives to overcome the incremental cost, customer concern about range, new technology, reliability, resale and the cost and availability of fuels. Until alternative fuels are widely available, dual-fueled vehicles are the only practical way to increase the use of alternative fuels and public policy should encourage this technology.

- We support CAFE credits for dual-fueled vehicles. Tying the credits to any measure of alternative-fuel usage is premature and would discourage the production and sale of such vehicles.

- The stringent emissions standards in the Clean Air Act in certain cases will constrain the use of some alternative fuels.

  - Compressed natural gas engines inherently emit fewer reactive hydrocarbons and carbon monoxide, but tend to have greater NO_x emissions than gasoline vehicles. This is because catalytic reduction of NO_x requires that a certain concentration of carbon monoxide be present in the gas stream entering the catalyst. There normally is not sufficient carbon monoxide present in CNG exhaust gas. The Tier I passenger car NO_x standard (0.4 gpm) may be achievable with CNG vehicles, but the Tier II (and California) NO_x standard (0.2 gpm) probably cannot be met with CNG vehicles.

  - Also, the clean fuels fleet provisions of the Clean Air Act require serious, extreme and severe ozone nonattainment areas to purchase increasing percentages of "clean fuel vehicles" beginning in 1998. These vehicles must meet a NO_x standard of 0.2 gpm, which again probably would not permit the use of CNG vehicles.

  - Although capability has not been demonstrated yet, we presently believe the constraints on meeting tighter emissions standards with FFVs are similar to that of gasoline-powered vehicles.

Energy Policy Issues

- We support an energy policy which promotes domestic energy production as well as overall energy efficiency. Also, we believe that any new vehicle fuel efficiency requirements should be considered only as part of an overall energy policy.

- Increased vehicle fuel economy has clearly contributed to reduced per capita fuel consumption. The only reasons overall car and truck fuel usage has increased is because there are about 40 percent more vehicles on the road than in 1975 and low energy prices have resulted in an increase in average vehicle miles driven.

Credit Trading

- Credits are critically important to offsetting the many factors affecting year-to-year CAFE performance such as market swings, economic cycles, changes in fuel prices and delays in launching new products. We believe that carryforward and carryback credit availability should be expanded or limitations on their use be removed.

- We especially believe that credit trading between a manufacturer's fleets (classes and categories) is an additional way to assure a manufacturer the flexibility to overcome these market factors. Such trading also would eliminate the need to shift a vehicle from one fleet to another for CAFE compliance reasons. Such shifts have resulted in some job losses, extra cost and other adverse impacts with no energy saving benefits.

Excessive Fuel Consumption Fee

- The level of fee suggested is so high that it would not be an option for major manufacturers -- whether or not the unlawful conduct provision was revised. For Ford, missing the standard by a half mile-per-gallon in a typical year would result in approximately a $200 million penalty.

Auto Scrappage Program

- Ford supports the concept of accelerating the removal of older, less-fuel efficient vehicles from the road. It is one of the best ways to improve the fuel efficiency of the fleet and reduce emissions.

- However, it must be recognized that such programs are difficult to administer and very expensive because people will not willingly give up their car unless they receive sufficient compensation to permit substitute transportation. For example, Ford participated with Unocal in such a program in California which paid consumers some $700 to turn in an older car.

International Comparison

- There are no CAFE standards in Japan and Europe. Europe chose to ask manufacturers to voluntarily increase fuel economy by about 10 percent after the oil embargo. Japan is now requesting similar improvements from manufacturers that sell in that country.

- Because of the difference in the way that governments measure fuel economy -- and the differences in emissions and other standards -- it is difficult to compare accurately the fuel economy of the various fleets. However, we believe U.S. vehicles already are the most fuel-efficient in the world on a product-for-product basis.

- Although estimated CAFE levels for European car fleets are in the mid-30s, this difference is fully accounted for by differences in the kinds of products consumers choose. Small cars account for about 65 percent of the fleet in Europe -- three times the U.S. level; engine displacement is about 30 percent less; 90 percent of European cars are equipped with manual transmissions and 14 percent with diesel engines.

- The primary reasons for the differences in the types of products consumers purchase in Europe are $3.00-$4.00 a gallon gasoline and significant taxes to discourage the purchase of larger cars and engines. Roads are narrow and travel is not as extensive. Also, parking is limited and more suitable to smaller vehicles. Surely, if any fuel economy technology existed, a manufacturer would gain a real competitive advantage by employing it.

Experimental Vehicles

- The question is not whether any manufacturer can build a car that gets significantly better fuel economy, but rather whether such cars can be made affordable in large numbers and still meet the broad range of consumer needs. Also, most of the experimental vehicles cited in technology discussions are not designed to meet existing or planned regulatory requirements and generally sacrifice many product and functional attributes in the interest of maximizing others (e.g., weight reduction, fuel economy, etc.).

- Presently, vehicles with fuel economy ratings of more than 40 mpg account for less than 5 percent of the market.

March 22, 1991
E:\pp\fe\320questions

General Motors' Responses
to
Questions for Hearing
on
Title XI, Subtitle A, S. 341
The Motor Vehicle Fuel Efficiency Act of 1991

1. **Determination of "Maximum Feasible Average Fuel Economy (MFAFE)"**
   Section 11007 of the bill sets forth a series of assumptions that the Secretary of Transportation would use in determining the "maximum feasible average fuel economy" (MFAFE) for passenger autos and light trucks (or classes of light trucks). Please provide an overall evaluation of this approach to determining MFAFE (and evaluate individual assumptions in the questions below).

The assumptions used in Section 11007 are subject to considerable interpretation when determining the MFAFE. We believe the statutory language in the current section 502(e) of EPCA coupled with some of the assumptions in Section 11007 will provide the necessary historic background and guidelines for the Secretary in determining MFAFE. However, since neither we nor Congress can necessarily foresee all the factors, we suggest a catch-all clause such as "and such other relevant factors as determined by the Secretary."

2. **Technology**
   a. Comment on the technology assumption in proposed section 502[e][2][A].
   b. Describe technologies not currently commercialized that are capable of being commercialized (as described in the proposed language) in the 1996 and 2002 time frames. Describe the potential fuel savings and market penetration rates of such technologies.
   c. How would MFAFE change as the assumption on technology changed? What if the technologies assumed were limited to technologies currently commercialized? What if consideration of market penetration rates and other limitations were omitted? Illustrate or roughly quantify this relationship in any way possible.

We believe the focus concerning technology and what is capable of being commercialized should be on what is currently available and in production rather than what someone might believe should be able to be in production.

The rapid gains in fuel economy made over the last 15 years have been accomplished importantly by downsizing and an average reduction in weight of about 1000 pounds. Technological improvements such as smaller, more powerful engines, fuel injection, improved catalyst technology, reducing tire rolling resistance, improved aerodynamics, conversion to front-wheel drive, reduced friction, and others have also contributed to improved vehicle fuel economy, but by far the biggest single factor in improving fuel economy has been through weight reduction. Further significant improvements in fleet fuel economy would require additional reductions in weight — either by restricting the availability of existing family-size cars or by downsizing the entire fleet once again.

The history of the motor vehicle industry has shown that significant technological improvements, such as reduced tire rolling resistance and automatic transmissions with lock-up converter clutches, are usually incremental and implemented over an extended period of time — as long as ten to twenty years, depending on the complexity of the technology and the cost to the consumer. If a potential fuel saving technology is not now incorporated in a mass produced vehicle, it is not likely to be in widespread usage by the turn of the century.

One can anticipate with a high degree of certainty that, if technological improvements are on the horizon, commercialization of such new fuel economy technologies would probably be expected first in Europe and Japan where the gasoline prices are from two to five times as high as they are in the United States.

These factors and General Motors' current leadership in nine of EPA's 18 fuel economy categories for vehicles with automatic transmissions provides some assurance that there are no technologies now being used commercially elsewhere in the world that could help us improve fuel economy in this country to the percentage or in the time frame being proposed under some legislation pending in Congress.

A vehicle product cycle is quite long and complex. Program plans for the '96 model year are in their final phase prior to being released for tooling purposes. The planning horizon for the 2002 model year extends only until approximately 1998, when tooling commitments will be put into motion. Over the next seven years, we see no technologies, not currently commercialized, that would improve the fuel savings of the internal combustion, gasoline-powered engines anywhere near the percentages being proposed. However, General Motors will continue to seek improvements in technology to maintain our overall fuel economy leadership, and continue to look for potential fuel economy breakthroughs.

3. **Performance**
   a. **Comment on the performance assumption in proposed section 502[e][2][B].**
   b. **EPA data indicate that average performance levels (as measured by horsepower and 0-60 acceleration time) have been increasing quite steadily since the early 1980's nearly all types of cars and light trucks. Do you agree? Please describe and explain the recent trends in performance and the likely trend in performance in the absence of changes in the CAFE law.**
   c. **To what extent have advances in technology and design in recent years been used to increase performance rather than to increase fuel economy? Please illustrate with specific examples.**
   d. **How would MFAFE change as the assumption on performance levels changed? Illustrate or roughly quantify this relationship in any way possible.**

e. As a matter of national policy, should Congress contemplate changes in CAFE law that trade off lower performance levels for greater fuel savings?

a. General Motors appreciates the concern demonstrated in Section 502[e][2][B] for maintaining current performance levels. This is a recognition that a valid definition of performance is not simply the stereotypical "0-60 mph" measurement or the "muscle car" description. Customers have a variety of needs, both for business and for pleasure, for their vehicles. To preserve customer uses, performance should not be degraded.

We do, however, have a concern with the proposed metric: torque x axle ratio, divided by curb weight, and we have had much difficulty in calculating exactly how it would work. We are concerned about the concept of attempting to limit performance through regulation or legislation. In our opinion, one simple metric cannot encompass all the interests of consumers. If the concept is preserved in the legislation, the metric should be more general, and the specifics should be worked out in rulemaking.

b. Trends in performance are the result of many factors, but you can be assured that if fuel prices stay low, customers will want increased performance. However, the definition of performance should be expanded to include utility and the efficiency with which work is performed — not simply 0-60 acceleration time. Little will have been gained if higher CAFE standards simply lead to a need for two or more vehicles to do what one can do now.

c. Technology has improved both performance and fuel economy over the past 20 years. The improvements in both areas have been impressive. They have been determined mainly by customer demand and competition. General Motors, and the auto industry, generally have also made excellent progress in other areas, including the driveability and safety of our products.

Given the tremendous gains in fuel economy, it would not be accurate to say that the manufacturers have focused excessively on performance. It is true that we observe carefully what our customers and potential customers do. We try to understand why they do or do not buy our products. At General Motors, we believe our current offerings reflect what the market wants and needs. If we provide more fuel economy than the market wants, at the expense of other vehicle characteristics of interest to consumers, including performance, it will result in lower sales.

d. If manufacturers were to diminish the performance of their vehicles, the maximum feasible average fuel economy may rise, although this would not be a certainty because of potential shifts in the mix of vehicles purchased. Thus, the central question for the manufacturers would be: would anyone buy the resulting products and in what volumes.

e. We do not believe Congress should substitute its judgment for that of the consumer on what vehicle performance is acceptable. We believe the most effective and efficient way to achieve any energy conservation goal for the nation would be through higher energy prices. This approach would allow performance requirements to be decided in the marketplace.

4. Size

a. Comment on the size and interior volume assumption in proposed section 502[e][2][C].

b. Describe and explain the recent trends in size and interior volume and the likely trend in these characteristics in the absence of changes in the CAFE law.

c. How would MFAFE change as the assumption on size mix and interior volume changed? Illustrate or roughly quantify this relationship in any way possible.

d. As a matter of national policy, should Congress contemplate changes in CAFE law that trade off smaller size or interior volume for greater fuel savings? Assume, for purposes of this question, that size is unrelated to safety.

a. Again, we appreciate the recognition implicit in the wording of S. 341 that utility should not be compromised. Size and interior volume are fundamental determinants of a vehicle's utility. So far General Motors has been able to meet current CAFE standards because we were able to take weight out of our vehicles by switching to front wheel drive and thus did not have to reduce interior volume to any great extent. Now, over 85% of our cars are front wheel drive. It is not clear to us what we would be able to do to meet significantly higher CAFE standards -- except downsize and reduce weight.

Freezing size and interior volume at 1990 levels might compromise utility in the out years since we cannot also freeze the country's demographics. We prefer to be able to consider the use requirements of our customers as they change over time.

b. Cars are getting somewhat larger in response to consumer demand. However, they cannot get much larger because of the binding effect of the current CAFE law. Even so, measured by the dimensions of parking spaces, the average size of a 1990 car is close to the size of a 1974 Pinto Wagon.

c. Fuel economy would increase as size and weight of a vehicle are reduced.

d. We do not believe Congress should dictate the size and interior volume we should build and consumers can purchase.

5. Emissions

a. Comment on the emission assumption in proposed section 502[e][2][D].
b. If he were to implement this section, should the Secretary assume that the Tier II emission standards of the Clean Air Act Amendments of 1990 take effect some time after 2002?
c. How would MFAFE vary given assumptions of Tier I or Tier II emission standards? Illustrate or roughly quantify this relationship in any way possible.

a. 502 [e][2][D] states, "meets all applicable emission standards:". This assumption does not comprehend that new emission standards might be imposed after the MFAFE is determined. There should be an adjustment mechanism to reflect requirements that are imposed later.

b. No vehicles have been developed that would meet, on a production basis, the Tier II requirement of a 0.2 NOx standard. Thus, the fuel economy penalty for the additional hardware required to meet this standard is not known. It therefore would be difficult, if not impossible, for the Secretary now to determine MFAFE for vehicles meeting Tier II standards. This vividly illustrates why the Secretary must retain the flexibility to amend any standards that are set almost ten years in advance of their effective dates.

c. Definite assumptions cannot be made in regard to Tier I and Tier II. Some uncertainty exists concerning Tier I, for example, whether onboard vapor recovery systems will be required. As stated in (b) above, the Tier II standards have not yet been shown to be technologically feasible. For example, given the fact that vehicles have not been produced to meet the 0.2 NOx requirement of the Tier II standards, we cannot quantify a fuel economy penalty.

6. Safety

a. Comment on the safety assumption in proposed section 502[e][2][E].
b. Are smaller automobiles less safe than large automobiles? Why or why not? Have studies of this question adequately controlled for other correlating factors affecting safety?
c. Are higher-performance automobiles less safe than lower-performance automobiles? Why or why not? Have studies of this question adequately controlled for other correlating factors affecting safety?
d. Do safety standards provide for an adequate level of safety regardless of the size of the automobile? Compare the effect on safety of vehicle size to the effects of other variables such as age, performance level of automobile intoxication, conformity to speed limits, etc.
e. As a matter of national policy, should Congress contemplate changes in CAFE law that trade off smaller size for greater fuel savings? Assume, for purposes of this question, that size is related to safety.

a. Section 502[e][2][E] allows the assumption that all passenger cars and light trucks manufactured during model years 1996 through 2001 or model year 2002 and thereafter will meet all applicable vehicle safety standards.

The National Traffic and Motor Vehicle Safety Act of 1966 requires General Motors to certify that each vehicle manufactured by General Motors conforms to all applicable Federal Motor Vehicle Safety Standards. General Motors will continue to meet the requirements of the National Traffic and Motor Vehicle Safety Act.

b. Occupants of smaller vehicles are at greater risk of injury and death than occupants of larger vehicles. In a collision involving two vehicles of differing mass, the vehicle with less mass experiences a greater deceleration, due to fundamental physical principles. Occupant injury risk and severity increase very steeply with increasing deceleration. These fundamental laws of physics impart an intrinsic safety advantage to vehicles of larger mass, whether the vehicles encounter another vehicle or stationary objects.

The laws of physics dictate that other correlating factors cannot change the result in a collision between two vehicles of differing mass. Because many variables exist, no study can control for every conceivable correlating factor. However, studies which we are aware of pertaining to this issue have adequately controlled for the significant factors affecting occupant safety.

Major variables have been considered in studies reviewed in Traffic Safety and the Driver (Evans 1991). From these studies it can be determined that, for vehicle collisions, effects of vehicle mass are so clear and large that other factors can have, at the very most, only a small relative effect. When one vehicle collides into another with twice the mass, the risk of death in the lighter vehicle is about ten times that in the heavier vehicle. Transferring from a heavy vehicle to one with half the mass increases driver fatality risk by a factor of about 2.8 (that is, a 140% fatality risk increase) when averaged over the mix of single-vehicle and two-vehicle traffic accidents.

c. From a vehicle equipment standpoint, higher-performance vehicles are as safe as lower-performance vehicles. (It is often the case that a higher-performance vehicle is safer since the enhanced performance enables the driver of the vehicle to pass, merge, or perform driving maneuvers out of an unsafe condition.) General Motors believes that the occupant injury differences evident between high-performance and low-performance vehicles are more attributable to driver behavior factors than to vehicle factors.

It is difficult to control for other correlating safety factors when comparing the safety of higher-performance vehicles to that of lower-performance vehicles because of the influence of driver behavior.

d. The Federal Motors Vehicle Safety Standards specify minimum requirements that the NHTSA has determined meet the need for motor vehicle safety regardless of vehicle features such as mass or size. When certifying compliance to the safety standards, a vehicle is measured against an objective standard of performance, not against a vehicle which may differ in mass.

Of the factors listed, the driver behavioral factor of intoxications has the greatest negative effect on vehicle safety followed by driver age, vehicle size, and other driver behavioral factors such as conformity to speed limits, respectively. We are not aware of any studies which have successfully isolated vehicle performance as an effect on highway safety.

e. We do not believe Congress should contemplate changes in CAFE that trade off the safety available to consumers for greater fuel savings. We believe the concept of not degrading safety ought to be included among the criteria considered in adopting a standard.

7. Assumptions Not Included

a. Cost-Effectiveness — Proposed section 502[e][2][A] does not contain an explicit assumption related to cost-effectiveness. Should an explicit cost-effectiveness assumption be one of the assumptions determining MFAFE? If so, what form should such an assumption take?

b. Adverse Auto industry Impact — Proposed section 502[e][2][A] does not contain an explicit assumption relation to adverse impact on the auto industry. Should such an assumption be one of the assumptions determining MFAFE? If so, what form should such an assumption take?

c. Other — What, if any, other modifications would you recommend to the assumptions that the Secretary would use in determining MFAFE?

We believe that questions involving cost-effectiveness, auto industry impact, and other assumptions not included in the MFAFE proposal would be best addressed by retaining the four criteria that current CAFE law requires be weighed and balanced by the Secretary of Transportation in undertaking CAFE rulemaking. In particular, we believe that the current requirement that the Secretary consider "economic practicability" in making decisions insures that concerns about cost-effectiveness, adverse auto industry impact, consumer response to dramatically changed fuel prices, and other economic factors must be taken into account. Should the statute fail to retain these provisions, however, some explicit assumptions about how the Secretary is to deal with the question of cost-effectiveness, adverse auto industry impacts, or changed circumstances due to changed market conditions would be required.

8. Would the proposed list of assumptions make the determination of MFAFE a fairly mechanical task for the Secretary? Or would there still be substantial room for judgment in making the determination? If the latter, what would be the key judgmental questions?

The proposed list of assumptions that would be used in determining MFAFE would not make the Secretary's task a mechanical one. It would, in fact, be highly judgmental and would require an extraordinary understanding of the technical, financial, organizational and marketing capabilities and limitations of each manufacturer. We should also be aware that it would call for significant prescience on the part of the Secretary in judging what new technologies and designs should be a part of production vehicles and which technologies and designs should be improved. That is why the Secretary ought to limit consideration of technologies to those that are currently commercialized. Since CAFE standards affect the entire vehicle and therefore the entire process for making motor vehicles, this bill would run the risk of greatly increasing the government's involvement in the affairs of a key industry. However, having the standards set administratively is far better than Congress picking arbitrary numbers.

9. **Translating MFAFE into Manufacturer-Specific Standards**
Section 11006 of the bill sets forth a method by which the Secretary of Transportation would set manufacturer-specific standards based on the MFAFE of al passenger autos or light trucks. Please evaluate this method and provide alternatives if desired. (Any alternative should address the issues raised in questions 10, 11, and 13 as well.)

If the Congress intends to continue to support the CAFE program, GM supports the approach set forth in Section 11006 that would have the Secretary prescribe, by rule, manufacturer-specific CAFE standards based on the MFAFE of all passenger automobiles and light trucks. We believe it makes far more sense to set the manufacturer-specific standards by rule than by legislative mandate. Setting appropriate CAFE levels for future years involves critical assumptions relating to such issues as current and future technology, economic practicability, the future price of oil, the appropriate future size and mix of vehicles, the level of performance that consumers will expect from their vehicles and the impact of future emissions and safety regulations. A rulemaking process allows for careful consideration of these assumptions and other factors important to the establishment of appropriate CAFE levels. Reasoned rulemaking, as contemplated by this bill, should serve to prevent the economic and social disruptions that likely would accompany manufacturers' efforts to meet the extreme CAFE mandates contained in several of the other legislative proposals.

10. **What ceiling or floors (if any) on the standards to be set in section 11006 should be added to this bill?**

Ceilings - Ceilings would be required to correct inequities that affect some limited-line, small vehicle manufacturers.

Floors - Floors would be necessary so that limited line manufacturers of larger vehicles do not gain a competitive advantage.

11. How should section 22006 be modified to address the problems of:
a. manufacturers not in existence in 1990, and
b. manufacturers that merge after 1990?

Equal increase standards that require a baseline, such as that in section 11006, must include rules to provide fair treatment for new fleets which do not have a fuel economy history to use as a baseline. These rules must address situations that allow manufacturers to gain a competitive advantage just by introducing new fleets. We believe these situations can be handled and what follows are examples of what possible solutions might include:

Domestic/Import	- Manufacturers that have only one fleet, either domestic or import, who establish a second fleet would use the baseline CAFE of the first fleet as the baseline CAFE for both fleets.
Mergers/ Joint Ventures	- New or combined ownership can obscure the relationship between vehicle fleets and their historic fuel economy. When existing products are involved, baselines of the new combined fleet would reflect the baseline of the old fleets.
Other Cases	- New companies, new products, and other cases can be handled by concepts such as "minimum" and "maximum" baselines.

We will work with the Committee staff to flesh out our ideas on solutions to these questions as well as the floor and ceiling concerns referenced in question 10.

12. The "percentage increase" method set forth in section 11106 has been defended as fair on the grounds that the differences in average fuel economy among manufacturers are largely due to differences in the size mixes of their fleets. This method has been attacked as unfair on the grounds that some of the differences are due to the adoption of advanced technologies by some manufacturers. To what extent does size mix explain these differences? To what extent does technology explain these differences? Are there other factors at work? Please quantify these answers if possible.

The CAFE program creates a competitive disadvantage for full-line domestic manufacturers, while doing precious little to conserve fuel.

The program pressures producers — especially full-line American producers — to build more fuel-efficient vehicles without creating incentives for consumers to buy them. In an environment of low gasoline prices, CAFE standards have become a binding constraint on the production of domestic manufacturers, restricting our ability to respond to the full range of consumer demands.

Congress' intent with CAFE was that consumers should drive more fuel-efficient vehicles. What was not anticipated was that consumers could have an alternative. Because of their prior specialization in small cars, some foreign manufacturers have been able to let their fleet CAFEs fall with the introduction of new, larger, high-performance models and still remain above the standard.

The most significant factor which accounts for differences in average fuel economy among manufacturers is size mix. In fact, studies comparing a full-line manufacturer to the size and mix typical of small car manufacturers have shown that nearly all of the difference in average fuel economy can be explained by mix. Looking at the difference between GM's 1990 performance and that of Nissan, Honda and Toyota, adjusted for mix, GM would have the same CAFE as Nissan and only about one mpg less than Toyota and Honda.

While vehicles that have already incorporated fuel enhancing technologies prior to the base year will not have the benefit of "re-applying" these technologies after the base year to boost their CAFE, this is true for all manufacturers.

13. **Would the amendments to the Motor Vehicle Information and Cost Savings Act proposed in Title XI give the Secretary adequate discretion to modify fuel economy standards as circumstances warranted? If not, provide recommendations on this issue.**

GM appreciates the committee's recognition of the importance of granting the Secretary adequate discretion to modify the fuel economy standards as conditions warrant. The history of CAFE has shown that factors outside of a manufacturer's control, such as a significant drop in oil prices that results in a shift in consumer demand toward large vehicles, can render a full-line manufacturer unable to comply with CAFE standards through no fault of its own. Accordingly, it is very important that the Secretary retain adequate discretion to amend the CAFE standards.

Section 11008 does provide the Secretary with adequate discretion to amend the new standards applicable to the 1996 and subsequent model years. However, the bill may cause some confusion concerning the Secretary's authority to amend the standards for model years before 1996. This confusion arises from the proposed deletion (in Section 11003) of Section 502(a)(4), which authorizes the Secretary to amend the standard for 1985 and subsequent model years. This confusion could be prevented if Section 11008 were revised to read (on page 168, line 18):

"(1) by striking 'subsection (a)(3)' and inserting 'subsection (a)' each place it appears."

Whenever the Secretary establishes the near term standard he should also set the long-term standards. However, to guard against unforseen circumstances, the Secretary should be required to reassess the long-term standard just prior to the effective date of the near-term standards and have the authority to adjust the standard or revise the effective date of the long-term standard.

14. Legislative vs. Administrative Decision-Making
Describe the advantages and disadvantages of a legislative vs. administrative determination of MFAFE. Describe the amount and quality of information currently in the public record on the potential for increased fuel economy.

The CAFE program, with its unintended consequences and its unforeseeable effects, has proven to be extremely complex. Not many individuals, including those who have lived with the program since its inception, are confident enough to say that they fully understand the CAFE program and all its ramifications. What may seem a matter of common sense or of a linear causal relationship, with CAFE, rarely is so.

However, if a CAFE approach is pursued, we urge reliance on a rulemaking process to determine appropriate standards. It would allow for detailed consideration of the assumptions and factors that go into setting CAFE levels. Among these factors are ones dealing with safety, financial, competitive, technological, employment, consumer satisfaction and other important issues.

The studies of technological feasibility by Messrs. Plotkin, Duleep and others are of concern to us because of their treatment of economic issues. We believe they include optimistic assessments of the costs and the timing of implementation. And we believe they fail to take into account such issues as marketing and safety risks and the engineering, manufacturing, financial and other resource constraints facing producers.

15. Credit Trading
Evaluate the credit carry-forward and credit trading system proposed under section 11010. Note any expected effects on fuel economy and compliance costs.
a. Some would argue that it would be unfair if credits earned prior to 1996 could be sued when new standards go into effect in 1996. Please comment.
b. Some would argue that manufacturers should not be able to carry forward indefinitely credits that are earned in 1996 or later. Please comment.

General Motors believes that credit carry-forward and trading provisions ought to provide manufacturers with greater flexibility consistent with the main goal of the law — reducing energy use in new vehicles.

a. We sympathize with those who maintain that it would be unfair if credits earned prior to 1996 were used to meet the standards in effect after

1996. Under current CAFE law, credits can be earned by manufacturers who are relatively specialized in the production of smaller cars regardless of the level of fuel economy technology embodied in their cars. Since one of the intentions of this proposal is to eliminate this source of "windfall" credits and to make all manufacturers bear an approximately equal burden in improving fuel economy, it may be appropriate to restrict the use of credits earned under the old CAFE law.

b. Once a new law is fully implemented, however, credits earned under the new CAFE regime should have an indefinite lifetime. Manufacturers should be provided with adequate incentives to improve the fuel economy of their vehicles at the earliest possible date. Allowing for unlimited credit lifetimes provides such incentives, since it fully rewards over-compliance with the standards in the early years of a new CAFE program. Allowing credits earned from early year over-compliance to offset later CAFE shortfalls would not reduce the energy saving potential of the program over its lifetime in comparison to requiring year-by-year compliance or providing for only very limited credit lifetimes. It will, however, offer the potential for considerably lower compliance costs.

16. The proposed credit trading system would remove implicitly the distinction between the imported and domestic fleets of a manufacturer.
a. To what extent have separate fuel economy standards for imported and domestic fleets preserved employment in the domestic auto industry? Did separate standards increase, maintain, decrease, or slow the rate of change in these jobs?
b. Provide specific examples where possible of the effects of separate standards on employment, e.g., effects on types of automobiles, specific firms or plants, or model lines.
c. How would the implicit removal of separate standards affect future employment in the domestic auto industry? Discuss the potential impacts on both plant siting and overall profitability, and their effect on employment.

The extent to which separate fuel economy standards for imported and domestic fleets have preserved employment in the domestic auto industry is hard to isolate.

Separate fuel economy standards for imported and domestic fleets have led to a number of trade-distorting effects, many of which were clearly not intended by the authors of the original legislation. While the two-fleet rule may have encouraged some increased domestic production of cars with higher fuel economy, its effect also has been to reduce domestic production of larger and higher performance cars and to encourage the entry of overseas producers into those upscale segments — to the detriment of domestic automotive production and employment.

This is because, owing to higher fuel prices and other institutional factors, overseas producers have historically had a comparative advantage in the production of smaller vehicles, while domestic producers have concentrated on the production of larger, family-size vehicles. Thus, when confronted with an increased CAFE mandate, domestic producers often must rely on restricting larger car output, as opposed to increasing the output of smaller cars. In addition, domestic manufacturers have incentives to reduce the domestic content of their larger vehicles so as to in effect make them "imports" under the two-fleet standard. Finally, the two-fleet rule provides incentives for firms with domestic transplant operations to limit the domestic content of those vehicles so as to retain the ability to average the fuel economy of transplant-produced vehicles with their high-mileage imported vehicles.

Looking to the future, if the distinction between domestic and foreign fleets is maintained, we can expect more of the same — costly trade-distorting consequences with no obvious fuel economy or domestic production benefits.

17. **Excessive Fuel Consumption Fee**
Section 11014 would modify the Motor Vehicle Information and Cost Savings Act so that failure to meet a fuel economy standard would no longer be unlawful. This section also boosts the fee for non-compliance from $5 to $20 per tenth of an m.p.g. per car. Evaluate this proposal. Would it give manufacturers adequate incentive to meet fuel economy goals?

GM supports Section 11014's removal of the unlawful conduct provision of Section 507 and the concept of assessing an "excessive fuel consumption fee" if a manufacturer does not meet its CAFE standard once it is determined that all credits (past, future or purchased) cannot make up the shortfall. GM does not believe the unlawful conduct provision is necessary to provide manufacturers an incentive to achieve the CAFE standards. GM also does not believe that it is necessary to boost the fee for non-compliance from $5 to $20 per tenth of a m.p.g. per vehicle. As has been seen in the few penalty assessments that NHTSA has commenced, the current $5 penalty can result in significant total penalty amounts, easily in the millions of dollars. A quadrupling of the amount is unnecessary and excessive, particularly when a CAFE shortfall is the result of factors beyond the manufacturers control, such as a shift in consumer demand due to a significant drop in gasoline prices. For example, if a manufacturer like GM failed to meet a standard by merely one-tenth of a m.p.g. due to a shift in consumer demand, a $20 per tenth fee would result in an excessive fuel consumption fee of $80 million (assuming a fleet of 4 million vehicles).

18. **Alternate Fuel Credits**
Section 513(g) of the Motor Vehicle Information and Cost Savings Act places a cap on the increase in average fuel economy that a manufacturer can gain through the sale of dual energy automobiles. Some have argued for increasing this cap (or removing it altogether) as a means of encouraging the use of alternate fuels. Others argue that such proposals could actually increase gasoline consumption by allowing fuel economy to decrease while providing no assurance that alternate fuels would be used

in dual energy automobiles. Evaluate these arguments and provide a recommendation on whether and how the cap should be modified.

General Motors supported enactment of the Rockefeller bill that established the credit for alternate fuels in part, because we believe programs that rely on incentives rather than "command and control" mandates are more likely to achieve their objectives. However, we did not support inclusion of the credit cap.

Removing the cap would act as an incentive to produce and sell dual-fueled vehicles. Fleet-type sales would have access to methanol because they are centrally fueled. Individual sales may initially operate on gasoline, but as methanol becomes available through the normal distribution system, these vehicles would be able to operate on it, thus reducing the time until the total fleet will be capable of operating on methanol.

19. Auto Scrappage Program
Sections 11016 and 11017 direct the Secretary of Energy to provide financial assistance to states for auto scrappage programs. Please evaluate this proposal.

Since new cars account for only a fraction of the total number of vehicles on the road and less than ten percent of gasoline consumption, it seems essential that any energy policy address all vehicles — new and used. A major flaw in mandatory energy conservation standards such as that contemplated in the proposed legislation is that they provide a strong incentive for people to hold on to the largest and lowest mileage vehicles in service. By restricting the availability of the most fuel-efficient new cars, such command and control legislation works against itself to encourage the uneconomic retention of older, larger and more powerful vehicles that offer the comfort, performance, carrying and towing capacity and other features that many Americans want and need. The corresponding decline in the scrappage rate of such vehicles serves to offset a portion of the theoretical energy savings contemplated in such legislation and contributes to other negative side effects, such as the increased emissions associated with keeping older, higher polluting vehicles in service beyond their useful life.

One way to deal with this problem might be for the government to offer financial incentives for early retirement of such vehicles such as that proffered in Section 11017 of the proposed legislation, which would encourage the retirement of all pre-1980 model year automobiles. Such an approach would surely be more cost-effective than mandatory conservation standards that work to increase the retention of older less fuel-efficient vehicles.

New (Additional) Murkowski Questions

It has been argued that increased CAFE standards will result in a significant downsizing of the fleet. At what point would your liability for accidents become compromised?

The main safety concern arising from higher CAFE standards is that significantly higher CAFE standards will result in further downsizing of vehicle fleets. All other things being equal, smaller vehicles cannot match the occupant protection of the larger vehicles on the road. In other words, if the average size of vehicles becomes significantly smaller, more people will be injured or killed than would be if the fleet was not downsized. This is simply an observation of a law of physics and of accident experience (i.e., in a collision, the lighter object experiences a greater deceleration from its impact with a heavier object. Occupant injury risk and severity increase very steeply with increasing deceleration.) This safety concern has been expressed by the Department of Transportation, the National Highway Traffic Safety Administration, the Insurance Institute for Highway Safety, and other safety experts and researchers. This is not to say that smaller, lighter cars are inherently unsafe. Indeed, GM's small cars are safe and meet all applicable federal motor vehicle safety standards. It is just that no matter how much safety is built into a small car, the occupants of the larger vehicle are at an advantage in an accident, all other things being equal.

Questions For Panel III

1. **The Administration has estimated that energy demand and supply initiatives can achieve comparable benefits under a balanced national energy strategy. By the year 2000, oil consumption can be reduced by 1.3 million barrels per day and domestic oil production can be increased by 1.8 million barrels per day. By the year 2010, oil consumption can be reduced by 3.4 million barrels per day and domestic oil production can be increased by 3.8 million barrels per day.**

   Would you agree that it is not enough to foster energy efficiency and the use of renewable energy resources, but we also must develop an energy policy which takes all reasonable steps to promote domestic energy production?

Yes, we agree that it is important for the federal government to pursue policies that allow all reasonable steps to promote domestic energy production. We also believe it is important that neither energy supply nor demand issues be considered in isolation. That is why we believe a comprehensive bill such as that proposed by Senators Johnston and Wallop is far preferable to Senator Bryan's narrowly focused CAFE legislation.

In considering what is reasonable in terms of promoting energy efficiency and production, we believe it is important to focus on policies that are cost-effective and that do not unduly harm the environment or the economy.

2. The current CAFE debate centers on defining the maximum feasible average fuel economy for automobiles and light duty trucks.
a. When determining technical feasibility, what consideration is given to economic feasibility from the standpoint of the consumer? For example, what is the relationship between economic feasibility as that term is used and cost-effectiveness from the standpoint of the new car purchaser?
b. What consideration is given to the financial capability of a given manufacturer to incorporate a technically achievable technology within its new car product line? And how is such capability influenced by product year considerations? In other words, what are the time constraints on how fast a given manufacturer can turn over its product line?

a. Technical/economic considerations:
Under current CAFE law, in determining the maximum feasible average fuel economy, the Secretary (through NHTSA) has assessed what technology can be commercially available to meet a particular model year standard, and has assessed economic practicability in terms of whether a possible CAFE standard is within the financial capability of the industry and would not cause substantial dislocations (e.g., major reductions in sales, employment or competition) in the industry or the economy as a whole. See e.g. Final Regulatory Impact Analysis - Average Fuel Economy Standard for Model Years 1987-1988 Passenger Cars (NHTSA, September 23, 1986.)

It has been judicially recognized that, for purposes of determining the maximum feasible average fuel economy, the NHTSA's consideration of technological feasibility may involve consideration of shifts in consumer demand. In 1986, the United States Court of Appeals for the District of Columbia Circuit upheld NHTSA's amendment of the 1985 light truck standard and establishment of the 1986 light truck standard despite the challenge that the agency had impermissibly considered the adverse effects of consumer demand on the fuel economy levels manufacturers could achieve. Center for Auto Safety v. NHTSA (793 F.2d 1322). In that case, the court noted that although Section 502(b) does not expressly designate consumer demand as a factor to be considered in setting standards at the maximum feasible level, neither does it exclude consideration of consumer demand, and "the factors of 'technological feasibility' and 'economic practicability' are each broad enough to encompass the concept." Id. at 1338.

The economic feasibility or cost effectiveness of a CAFE standard from the standpoint of a new vehicle purchaser is an important factor that should be considered by the Secretary in determining maximum feasible average fuel economy. A technology that is so costly that the consumer will not recoup the added cost through gasoline savings should not be considered technically or economically feasible. To ensure that the Secretary considers these important factors, S. 341 should include the current Section 502(e) criteria of technological feasibility and economic practicability among the Secretary's considerations in determining the maximum feasible average fuel economy for model year 1996 and beyond. Continuation of the current 502(e) criteria of technological feasibility and economic practicability would complement the considerations proposed in Section 11007 and prevent the jettisoning of well-developed and judicially approved criteria which have well served the public, industry and the Secretary.

b. How fast a manufacturer can turn over its product line and what considerations would go into determining the financial capability of a manufacturer in determining the maximum feasible average fuel economy for automobiles and light trucks are necessarily highly complex and difficult issues to define through rules and regulations. Competition in the marketplace puts pressure on all manufacturers to shorten the leadtime with which it brings products to market. The highly competitive nature of the North American car market, where consumers can choose from over six hundred car models produced by a large number of vehicle producers, puts a premium on the ability of a manufacturer to anticipate and respond to customer demands faster and with higher quality products than potential competitors.

All manufacturers who intend to stay in the car and truck market are employing strategies to shorten the time it takes to bring new products to market to meet customer demand. The ability of a manufacturer to fund these model changeover programs is critically dependent on the success of its product offerings in the marketplace. As shown by the changes in market penetration of various manufacturers and in their profitability, success is not guaranteed. The ability of a manufacturer to succeed is dependent on a large number of variables, including financial, regulatory, manufacturing and marketing. All of these variables are fraught with uncertainties that make it difficult to predict outcomes in advance. But the difficulties and uncertainties should be taken into account when attempting to judge a manufacturer's ability to meet higher CAFE standards.

3. **What is the added cost, if any, of the various technological improvements such as variable value control, fuel injection, etc., to the consumer in terms of frequency and cost of repairs?**

This question involves proprietary information which we would prefer not to release.

4. **Internationally, what correlation is there between CAFE standards in Japan and Europe and per capita fuel consumption?**

There is no correlation between CAFE standards and lower per capita fuel consumption in Japan and Europe because neither Japan nor any of the European countries has a CAFE program. The lower per capita fuel consumption experienced in these countries is due to a variety of factors, most of which are related to the much higher level of fuel prices and taxes found there. Europe and Japan are more densely populated than is the United States, and this is no doubt responsible for some of their lower fuel consumption. But higher fuel prices have been a major factor in reducing per capita fuel consumption in these countries, affecting consumption in three ways:

1) They have discouraged many consumers from purchasing cars, resulting in lower per capita rates of new car ownership,

2) They have encouraged those consumers who do purchase vehicles to select vehicles offering higher fuel economy, and

3) They have encouraged those who own vehicles to drive less.

The evidence we have seen suggests that the first and third of these factors — lower rates of vehicle ownership and miles driven per vehicle — together account for far more of the differences in per capita fuel consumption between the U.S. and other countries than does the second factor — differences in new vehicle fuel economy.

5. What effect has existing CAFE standards in the United States had on per capita fuel consumption? And on vehicle miles driven?

According to a recent study by Robert Leone and Thomas Parkinson, CAFE standards have had a negligible impact on reducing per capita fuel consumption — reducing total consumption of gasoline by the equivalent of only 2.4 days worth of supply over the six-year period 1984-1989 — a reduction in fuel consumption of roughly one-tenth of one percent.

One of the reasons for this small showing is that, by lowering the per mile cost of driving, mandated increases in the fuel efficiency of new vehicles have the same effects as equivalent reductions in the price of gasoline on driving behavior. The best available estimates suggest that for every 1 percent increase in new car fuel economy, consumers will respond by increasing VMT by 0.3 percent. Since Leone and Parkinson credit CAFE standards with increasing the average fuel economy of the new car fleet by approximately 1.5 miles per gallon since 1984, or about a six percent increase over the level that would otherwise have prevailed, the result has been an increase in VMT for these cars of approximately 2 percent.

6. Would you agree that analyses of the feasibility of meeting any specified automotive fuel economy must of necessity assume retention of the emission standards contained in the 1990 Clean Air Act Amendments?
a. What assumption did you make with regard to the requirements in 1990 Clean Air Act Amendments? If I am not mistaken your initial analyses were performed prior to enactment of the 1990 Amendments.
b. Reportedly electrically heated catalysts may be needed to meet the more stringent HC and CO standards. If so, the accompanying weight increases, together with other engine modifications are estimated by some experts to reduce fuel economy by 17 percent. Would you comment?
c. Another concern is limitations on the use of certain engine technologies. For example, lean-burn gasoline technologies which are utilized in Europe by companies such as Toyoto are capable of achieving a 10 percent increase in fuel economy over comparable gasoline engine technologies. However, I understand that with such technology it is very difficult to control nitrogen oxides emissions to the levels required by

the Tier II emissions standards in the 1990 Amendments. Would the CAA preclude use of such promising energy efficiency technologies in the United States to meet CAFE standards?
d. If so, is it not unrealistic to base U.S. efficiency standards on European experience with such technologies?

We would agree that any analysis of feasibility of meeting any specified automotive fuel economy standard must of necessity assume retention of the emission standards contained in the 1990 Clean Air Act Amendments. In addition, it should also include any other new emission or safety standards that become effective.

a. At this time, the technology which would be used to meet possible Tier II standards under the 1990 Clean Air Act Amendments has not been defined, so it is not possible to estimate the fuel economy impact. One possible technology which has been mentioned, the electrically heated converter, clearly would a negative impact on fuel economy as discussed below.

b. The electrically heated catalyst would have a negative impact on vehicle fuel economy for two reasons. First, the energy to heat the converter is derived from the fuel. Second, the additional mass attributed to the electrically heated system increases vehicle mass.

Consider first the electrical energy required to heat the converter. Most of the published results with heated converters have used Camet heated converters supplied by the Camet Company, a subsidiary of W. R. Grace.

In SAE Paper 900503, Whittenberger and Kush of Camet and W. R. Grace respectively describe a system which draws 750 amps from a battery at 9.5 volts for 30 seconds in a typical heating cycle. This is an energy draw of about 59 watt-hours. This energy must be generated by the alternator at 50% efficiency and transferred in and out of the battery at about 80% efficiency before it gets to the converter power circuit. Thus, the engine must generate 147.5 watt-hours to recharge the battery, and if we assume an engine fuel consumption of 250 g/kWh, which is excellent for a spark-ignition engine, the total fuel required to heat the converter is 37 grams per heating cycle. A vehicle operating at 27.5 mpg uses 100 grams of fuel per mile. For the 7.5 mile FTP, 37 grams of fuel to heat the converter represents an increase in fuel consumption of 4.9% and this percentage would be higher for a vehicle with better fuel economy.

Since the discharge cycle described above is estimated to reduce the life of the typical lead-acid car battery by 80%, some manufacturers have indicated that a second battery would be needed to power the converter. An additional fuel economy penalty would then be paid due to the mass of the battery, power module, cables and converter. The size of this penalty would vary with the vehicle; it would probably raise the vehicle weight one EPA test class.

c. The current emissions control systems used on all gasoline powered vehicles sold in the U.S. use an exhaust gas oxygen sensor and computer control to operate the engine at the stoichiometric (chemically correct) air-fuel ratio so that exhaust emissions can be controlled with an exhaust catalyst. Lean-burn systems as used by some in both Europe and Japan operate the engine with excess air at air-fuel ratios leaner than stoichiometric. This results in fuel economy benefits due to reduced pumping losses and improved thermodynamic properties, but it makes the job of controlling NOx emissions more difficult.

In our current systems, we rely on exhaust catalysis to meet the tailpipe NOx standard. It is not unusual to see engine-out NOx levels of 3.4 grams per mile reduced by 95% or more at the tailpipe. At present, there is no catalyst which will reduce NOx in lean exhaust, so engine-out NOx levels must be brought down to the tailpipe standard. Our best research efforts have brought single test engine-out NOx levels down to about a 1.0 g/m level with a lean-burn system, but neither we nor our competitors have been able to lower emissions sufficiently to certify such a vehicle at today's NOx standard of 0.4 g/m. Future NOx standards appear to be clearly unattainable with lean-burn technology.

d. It is unreasonable to base U.S. efficiency standards on a technology which cannot meet U.S. emissions regulations. Again, no manufacturer has demonstrated the ability to meet U.S. NOx standards using a lean-burn approach, let alone maintain in compliance over the useful life of the vehicle.

7. **There are press reports of experimental cars capable of achieving over 50 miles per gallon. Why (what?) are the constraints on making such cars available to consumers?**

There seems to be a lack of information about the availability of cars with high fuel economy ratings. This question, which mentions press reports about "experimental" cars capable of achieving over 50 miles per gallon, is evidence of this lack. There have also been reports of Members of Congress praising foreign prototype vehicles which get as much as 70 mpg — with one or two passengers facing backwards or a suitcase or two in the rear.

The Geo Metro (XFi) has the highest CAFE rating of any production vehicle sold in the United States, and it is sold by General Motors. Between October 1, 1990 and February 28, 1991, over 28,000 of these vehicles have been sold here. The main constraint on making such vehicles available to consumers is the lack of demand for them. Less than 3% of the American people want such cars at today's gasoline prices.

8. **One of the objectives of the Administration's National Energy Strategy and S. 341 is to foster the use of alternative fuels such as natural gas in automobiles. Yet compressed natural gas burns at extremely high temperatures which lead to difficulty in controlling nitrogen oxide emissions.**
   a. Does the Clean Air Act constrain the feasibility of use of CNG as an alternative transportation fuel?
   b. Would similar constraints also apply to flexible fuel vehicles which are capable of using gasoline or methanol?

The statement that natural gas burns hotter than gasoline and gives higher NOx emissions is in error. Adiabatic flame temperatures for methane are lower than gasoline, and engine-out emissions in GM Research tests have been generally equal or lower. Many natural gas vehicles have higher NOx emissions on natural gas than on gasoline, but this is because they are generally calibrated lean, resulting in little NOx reduction in the catalyst.

a. The feasibility of natural gas vehicles could be constrained if the Environmental Protection Agency were to limit total hydrocarbon emissions for these vehicles to 0.41 grams per mile or lower.

b. For flexible-fuel vehicles, there are two emissions concerns. One is formaldehyde emissions, which may be very difficult to control to meet Clean Air Act requirements. A bigger concern is evaporative emissions with low concentration methanol blends, such as 10% methanol. These vehicles meet current evaporative emissions requirements with 10% methanol but may not be able to meet requirements with the future evaporative emissions procedure being proposed by EPA. If future methanol vehicles were non-flexible, operating only on 85% methanol, meeting proposed EPA evaporative emissions requirements would be about equal in difficulty to meeting these same requirements with gasoline.

9. Earlier DOE estimated that a 0.7 grams per mile nitrogen oxide standard could increase oil consumption in 2010 by 250,000 barrels per day and could restrict or eliminate the use of diesel engines in light duty trucks. By comparison, a standard of 0.4 grams per mile standard would increase oil consumption by only 50,000 barrels per day. Would you comment?

We agree that a 0.7 gram per mile (g/mi) nitrogen oxide (NOx) standard could restrict or eliminate the use of diesel engines, not only in light-duty trucks but also in light-duty vehicles (passenger cars). With a 0.4 g/mi standard, we believe it is even more likely that diesel engines will be eliminated in cars and light trucks. However, there is relief for diesel engines from the 0.4 g/mi NOx standard in the 1990 Amendments to the Clean Air Act. The Amendments call for a 1.0 g/mi NOx standard through 2003 for the smallest diesel-powered light trucks.

However, it is even possible that cars and the smallest light trucks will face a 0.1 g/mi NOx standard after the turn of the century. Clearly, as the NOx standard becomes more stringent, it becomes more and more likely that diesel engines will be eliminated.

We are not sure how DOE came up with its increased crude oil consumption figures. There are only limited data on which to make such an estimate. The fuel economy data for emission certification-fuel vehicles could have been used. Using matched pairs of engine families, one could have compared the fuel economy values of California production vehicles designed for either the 0.7 or 0.4 g/mi NOx standard to the corresponding values for federal vehicles designed for the 1.0 g/mi NOx standard. However, there is a risk in making such a comparison, because of different rules for selecting either California or federal emission certification vehicles. California rules are geared for the selection of the high production volume vehicles, while federal rules require selection of vehicles with the most difficult task of passing the emission standards. Thus, the federal method causes the vehicles selected within an engine family to be the heaviest and to have the poorest fuel economy because of the weight. Therefore, any fuel economy losses caused by more stringent California NOx standards could be masked.

Based on our experience with NOx emission control, we are convinced that, when using similar three-way closed-loop emission control systems more stringent NOx standards will lower CAFE values.

In addition to the impact of more stringent NOx standards, (a) the low temperature carbon monoxide (CO) standard scheduled to start phasing-in 1994 (and could even become more stringent after 2000) (b) the on-board computer systems and sensors to diagnose emission control system performance (possibly scheduled in 1994 for both California and federal vehicles), (c) the more stringent evaporative emission control regulations being studied by the federal government (already required in California with phase-in starting in 1995), and (d) the possible on-board refueling requirements could all negatively impact fuel economy. Each of these four changes could require additional emission control hardware to be installed on vehicles. Any added weight will diminish fuel economy.

In the case of low temperature CO, additional catalysts installed close to the engine for faster warmup might be required. Even electrically heated catalysts with their associated controllers and heavier batteries might be required.

ADDITIONAL QUESTIONS FOR GM

A. Dr. Whitman, on page 3 of your testimony you state that "other aspects of the CAFE program have reduced and will continue to reduce fuel savings potential even further." Will you please give some specific examples and elaborate for the record?

The CAFE program is ineffective, in our judgment, because it works against itself. CAFE leads consumers to react in ways that tend to offset the intended savings in fuel use. Increases in vehicle fuel economy actually lower the cost of driving and thus provide an incentive for U.S. drivers to increase the number of vehicle miles driven.

The purpose of the CAFE program is to force motor vehicle manufacturers to improve fuel economy often at the expense of the performance of the vehicles and by lowering the average size and weight of vehicles. When it is binding, the CAFE program is designed to require car and truck manufacturers to deny consumers vehicles with the carrying capacity and performance they want. As a result, some consumers retain older, less fuel-efficient vehicles or trade for newer used cars and trucks. Others may switch to the less fuel efficient car and truck offerings of manufacturers who are less constrained by CAFE because they have specialized in producing small cars over the years. And still others may decide to switch from passenger cars to light trucks or vans in order to meet their transportation needs.

In addition, it is worth noting that each increase in the CAFE standard has the potential for saving less and less fuel. For example, an increase in one mpg, from 14 mpg (1975 fleet average) to 15 mpg, produced fuel savings of around 71 gallons on a car driven 15,000 miles. A one mpg increase, from 28 mpg (today's average) to 29 mpg, produces a savings of just over 18 gallons for the same 15,000 miles. This arithmetic and the fact that CAFE improvements are progressively more costly, tells us that each mpg added to the standards costs more and more and saves less and less fuel for the same miles driven.

B. You testify that you believe it "would make sense to rely on policies that work with market forces." I agree. Would you please give specific recommendations?

Our experience and independent research show that consumer choices of vehicles and their use of those vehicles is influenced by the price of fuel. When gasoline prices were on the rise and were forecast to keep rising, demand for fuel efficient cars was so strong that we did not have difficulty in meeting CAFE standards. But as gasoline prices have fallen and expectations about their future path have been adjusted downward, it has become difficult to induce consumers to purchase vehicles having high levels of fuel economy.

That is why General Motors has consistently urged that, if the government wishes to affect the consumption of petroleum-based fuels, it ought to consider using policies that increase the price of the fuels. For example, in considering policies to address concerns about the potential for global climate change, GM has suggested that consideration be given to broad-based economic incentives rather than policies such as the CAFE program that focus on just one use of fossil fuels. Specifically, we have suggested that consideration be given to a "greenhouse" or carbon fee that would create an incentive to induce all sources of carbon dioxide to reduce their emissions.

Similarly, if the Congress is interested in encouraging additional energy conservation, we have suggested that it take a look at a broad-based energy tax or fee, which provide all users of energy with an incentive to conserve. Market-based incentives such as these can begin saving energy almost immediately as consumers around the country respond individually to the market's signals.

The principal flaw with the CAFE program, in our judgment, is that it provides consumers with no incentive to conserve energy. Indeed, with real gasoline prices at or close to historic lows, consumers have little or no incentive to increase energy conservation. If further government intervention to accelerate energy conservation is undertaken, broadly-based, market reinforcing mechanisms such as a carbon fee or BTU taxes would be far more effective and efficient.

C. What specific safety concerns do you have with the approach taken by Senator Bryan in S. 279?

To the extent that implementation of S. 279 forces an increase in the sale of smaller vehicles, and most experts believe that would be the case, there are complex safety implications that could result. All other things being equal, mass is a major element of the basic principles of physics that apply in vehicle crashes. Safety research confirms also a statistical relationship between vehicle weight and occupant fatality and injury risk. That relationship shows that the lighter the vehicle, the greater the risk of injury or death in a collision.

D. Do you generally support the approach of S. 341? What specific recommendations do you make for improvements? Do you have a suggestion for an alternative approach?

If a CAFE approach is pursued, we believe it is important to rely on a rulemaking process. In general, we support many of the concepts included in S. 341.

As our statements to the Committee noted, setting CAFE standards is an inherently complex undertaking fraught with great uncertainties about what is possible and what the impact might be on the industry, employment, highway safety and consumer satisfaction. For these and other reasons, we continue to believe that CAFE standards are not an effective means for promoting energy conservation. That is one of the reasons we believe a broadly-based energy charge would be the most effective and least costly means of encouraging any acceleration in energy conservation.

3/28/91

ASSOCIATION OF INTERNATIONAL AUTOMOBILE MANUFACTURERS, INC.
1001 19TH STREET NORTH, SUITE 1200 • ARLINGTON, VIRGINIA 22209 • (703) 525-7788 • FAX (703) 525-8817

March 14, 1991

CHAIRMAN
J. REILLY
ISUZU

1ST VICE CHAIRMAN
D. SMITH
TOYOTA

2ND VICE CHAIRMAN
P. HUTCHINSON
VOLKSWAGEN

TREASURER
Y. SUZUKI
NISSAN

SECRETARY
W. KENNEDY
ROLLS-ROYCE

BMW
DAIHATSU
FERRARI
HONDA
HYUNDAI
ISUZU
JAGUAR
MAZDA
MITSUBISHI
NISSAN
PEUGEOT
PORSCHE
ROLLS-ROYCE
ROVER
SAAB
SUBARU
SUZUKI
TOYOTA
VOLKSWAGEN
VOLVO
YUGO

PRESIDENT
G. NIELD

Hand Delivered

The Honorable J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
136 Senate Hart Office Building
Washington, DC 20510

Dear Mr. Chairman:

On behalf of Jack Reilly I am enclosing 20 copies of the Association's additional comments for the record which addresses the questions you submitted on March 5, 1991. We would welcome the opportunity to discuss these in further detail with you staff.

Sincerely,

George C. Nield
President

cc: Karl A. Hausker

ADDITIONAL QUESTIONS FROM SENATOR MURKOWSKI RE HEARING ON TITLE XI, SUBTITLE A, OF S.341, NATIONAL ENERGY SECURITY ACT

QUESTION FOR MR. BOLTZ, MR. PESTILLO, MS. WHITMAN AND MR. REILLY:

- It has been argued that increased CAFE standards will result in a significant downsizing of the fleet. At what point would your liability for accidents become compromised?

Questions for Mr. John E. Reilly, AIAM, from
Senator Malcolm Wallop (R-WY)
CAFE provisions of S. 341, the Energy Security Act of 1991
February 28, 1991

QUESTIONS FOR PANEL III

1. The Administration has estimated that energy demand and supply initiatives can achieve comparable benefits under a balanced national energy strategy. By the year 2000, oil consumption can be reduced by 1.3 million barrels per day and domestic oil production can be increased by 1.8 million barrels per day. By the year 2010, oil consumption can be reduced by 3.4 million barrels per day and domestic oil production can be increased by 3.8 million barrels per day.

   Would you agree that it is not enough to foster energy efficiency and the use of renewable energy resources, but we also must develop an energy policy which takes all reasonable steps to promote domestic energy production?

2. The current CAFE debate centers on defining the maximum feasible average fuel economy for automobiles and light duty trucks.

   a. When determining technical feasibility, what consideration is given to economic feasibility from the standpoint of the consumer? For example, what is the relationship between economic feasibility as that term is used and cost-effectiveness from the standpoint of the new car purchaser?

   b. What consideration is given to the financial capability of a given manufacturer to incorporate a technically achievable technology within its new car product line? And how is such capability influenced by product year considerations? In other words, what are the time constraints on how fast a given manufacturer can turn over its product line?

3. What is the added cost if any of the various technological improvements such as variable valve control, fuel injection, etc., to the consumer in terms of frequency and cost of repairs?

4. Internationally, what correlation is there between CAFE standards in Japan and Europe and per capita fuel consumption?

5. What effect has existing CAFE standards in the United States had on per capita fuel consumption? And on vehicle miles driven?

6. Would you agree that analyses of the feasibility of meeting any specified automotive fuel economy must of necessity assume retention of the emission standards contained in the 1990 Clean Air Act Amendments? To do otherwise would lead to overly optimistic estimates of potential fuel efficiency gains.

   a. What assumption did you make with regard to the requirements in 1990 Clean Air Act Amendments? If I am not mistaken your initial analyses were performed prior to enactment of the 1990 Amendments.

   b. Reportedly electrically heated catalysts may be needed to meet the more stringent HC and CO standards. If so, the accompanying weight increases, together with other engine modifications are estimated by some experts to reduce fuel economy by 7 percent. Would you comment?

   c. Another concern is limitations on the use of certain engine technologies. For example, lean-burn gasoline technologies which are utilized in Europe by companies such a Toyoto are capable of achieving a 10 percent increase in fuel economy over comparable gasoline engine technologies. However, I understand that with such technology it is very difficult to control nitrogen oxides emissions to the levels required by the Tier II emissions standards in the 1990 Amendments. Would the CAA preclude use of such promising energy efficiency technologies in the United States to meet CAFE standards?

   d. If so, is it not unrealistic to base U.S. efficiency standards on European experience with such technologies?

7. There are press reports of experimental cars capable of achieving over 50 miles per gallon. Why are the constraints on making such cars available to consumers?

8. One of the objectives of the Administration's National Energy Strategy and S. 341 is to foster the use of alternative fuels such as natural gas in automobiles. Yet compressed natural gas burns at extremely high temperatures which lead to difficulty in controlling nitrogen oxide emissions.

   a. Does the Clean Air Act constrain the feasibility of use of CNG as an alternative transportation fuel?

   b. Would similar constraints also apply to flexible fuel vehicles which are capable of using gasoline or methanol?

9. Earlier DOE estimated that a 0.7 grams per mile nitrogen oxide standard could increase oil consumption in 2010 by 250,000 barrels per day and could restrict or eliminate the use of diesel engines in light duty trucks. By comparison, a standard of 0.4 grams per mile standard would increase oil consumption by only 50,000 barrels per day. Would you comment?

Additional Question of John E. Reilly

A. Your statement opposes the use of uniform percentage increase in CAFE standards as in S. 341. Would you explain more fully what you believe to be the problems and limitations associated with this approach?

Additional Question for international auto group

A. To what extent does the fact that most domestic and foreign automakers have some type of equity, joint venture, marketing, manufacturing or other agreement affect the decision by Congress on fuel efficiency standards? Please comment on specific problems which you are aware of which are associated with Senator Bryan's bill (S. 279) and provide detailed comments for the record. How can we address those problems?

Association of International Automobile Manufacturers, Inc.

COMMENT FOR THE RECORD

Concerning

S. 341

The National Energy Security Act

Hearings Before the United States Senate
Committee on Energy and Natural Resources

March 14, 1991

The Association of International Automobile Manufacturers (AIAM)[1] is a trade association that represents companies which distribute passenger cars and light trucks in the United States that are manufactured both here and abroad. The association represents 21 companies which employ thousands of Americans in their distribution, transportation and manufacturing operations. The international automobile industry, including dealers, suppliers, port and assembly line workers and others in the United States provides jobs to more than 300,000 Americans. This supplements our testimony presented on February 28, 1991.

AIAM firmly believes that the current CAFE scheme is not sensitive to a manufacturers model mix and consumer demand. Regulation of vehicle fuel economy should be made as fair and equitable to all manufacturers as possible. It should not penalize limited-line manufacturers who cannot average across a broad product line or who offer vehicles for specific market niches. It should not penalize those who have performed better in the past and exceeded CAFE requirements. Nor should it penalize consumers who have varying needs for vehicles, such as those who may wish to carpool, use their vehicles in work, or perceive greater safety in larger vehicles.

---

[1] AIAM represents: American Honda Motor Co., Inc.; American Suzuki Motor Corporation; BMW of North America, Inc.; Daihatsu Motor Co., Ltd.; Fiat Auto U.S.A., Inc.; Hyundai Motor America; Isuzu Motors America, Inc.; Jaguar Cars, Inc.; Maserati Automobiles, Inc.; Mazda Motor of America, Inc.; Mitsubishi Motor Sales of America, Inc.; Nissan North America, Inc.; Peugeot Motors of America, Inc.; Porsche Cars North America, Inc.; Rolls-Royce Motor Cars Inc.; Rover Group USA, Inc.; Saab Cars USA, Inc.; Subaru of America, Inc. Toyota Motor Sales, U.S.A., Inc.; Volkswagen of America, Inc.; Volvo North America Corporation; and Yugo America, Inc.

Any fuel economy legislation should meet a number of important criteria. These include:

- Contribute to an actual reduction in fuel consumption
- Avoid anti-competitive effects, to the extent possible
- Avoid limitation of consumer choice of vehicle size, performance, and utility
- Establish fuel economy goals that are technologically feasible, cost effective, and provide adequate lead time for compliance
- Stimulate development and application of fuel economy technology
- Allow product mix flexibility within a manufacturer's fleet to meet any future requirements

Alternatives to CAFE have been suggested, including one put forth by the Office of Technology Assessment (OTA) at the hearing. AIAM believes that alternatives should be considered and that a market segment based approach to fuel economy requirements may be a viable way to address the points outlined above. Any approach of this nature should not disrupt marketplace competition, as other CAFE schemes do. By accounting for feasible fuel economy levels for vehicles in each competing segment of the market, some of the anti-competitive aspects of more traditional forms of CAFE could be mitigated. DOT should be given the authority to use its expertise to determine the details of an appropriate compliance scheme.

Most proposed legislation on fuel economy fails to take the consumer into account. Consumers are sophisticated enough to consider the trade-offs in new car or truck purchases and do so every day. If manufacturers are forced, through a poorly designed CAFE requirement, to build smaller, less useful vehicles, the consumer will likely reject them if the price of fuel is low. It is more cost-effective for that consumer to keep an older vehicle with more utility, even if its fuel economy is lower, than to purchase a newer vehicle.

The only way that a consumer will want to pay the price for a smaller, more fuel economic car or truck is if the price of driving (mostly from the cost of fuel) makes some impact on his purchase decision. With the price of fuel lower than it ever has been, on an inflation adjusted basis, this is not the case. The consumer will choose to keep an older vehicle with more utility or other desired features than pay a premium for a less useful, but more fuel economic one.

This discussion highlights a critical fact for any CAFE program that should be obvious, but seems to be often forgotten. It is the marketplace that ultimately determines a manufacturer's ability to achieve the CAFE standard. Since CAFE is a sales-weighted average, the ultimate level depends on which vehicles sell and which do not. If a particular vehicle model with high fuel economy does not sell as planned, then a manufacturer may fail to achieve the standard, in spite of all good faith efforts.

As stated by AIAM in earlier testimony, there are inequities in CAFE and the alternatives being discussed, but we have been asked to comment specifically on the problems posed by the uniform percentage increase approach to CAFE contained in S. 341. As AIAM and a number of its members have pointed out in comments to Senator Bryan's bill (S. 279), this approach would place a higher requirement on, and therefore penalize, those manufacturers which have done the best job in the past to meet or exceed the current requirement. It could also result in a manufacturer with a CAFE level of 38 mpg paying a penalty while one with a CAFE of 29 pays none. We think it is bad public policy to send a signal that the "reward" for excellence is to be put at a competitive disadvantage.

The question of why "experimental cars capable of achieving over 50 miles per gallon" are not "available to consumers" has been asked by Senator Wallop. There are two answers to this question.

First, anyone who wants a vehicle that achieves 50 mpg can buy one right now -- vehicles of this type are not experimental, but are being produced. These include the Honda Civic CRX HF and the Geo Metro XFI. However, these vehicles are small and do not meet the needs of a large number of Americans such as those who have large families or need to carry a substantial amount of cargo. Sales of this type of vehicle represent less than one percent of the new car market.

Second, the question really concerns a number of concept cars that were developed at the time of the earlier oil crises to determine what level of fuel economy could be achieved if other important vehicle attributes were ignored. High levels of fuel economy were achieved in these vehicles, but at the expense of important attributes such as passenger or luggage capacity, comfort, performance, compliance with emissions or safety standards, and vehicle cost. To be saleable, a motor vehicle must meet a large number of constraints placed on it both by government regulation and consumer needs and desires. Concept cars -- some of which were made over a decade ago -- provide useful insights, but may well not be intended to represent a useful compromise of all the attributes that appeal to the average car buyer.

One of the positive aspects of S. 341 is the recognition of the need to look at the impact of emission and safety standards on the ability of manufacturers to achieve specified CAFE levels. New safety requirements and certain engine emission control technology will add weight and offset some fuel economy gains that have been achieved.

The California Air Resources Board is touting the electrically-heated catalyst as the solution to achieving extremely low emission levels. While such a system is still in its embryonic stages, some early estimates indicate that this control system could reduce fuel economy by seven percent due to the weight of larger or additional batteries, controllers, wiring, etc. Other emission and safety standards will have additional negative fuel economy impacts.

Because it is important that any consideration of fuel economy requirements for motor vehicles be part of an overall energy policy, it is commendable that S. 341 attempts to do so. U.S. energy policy should address all forms of energy use, in terms of both conservation and production.

There is a general misconception that conservation will eliminate imports of foreign oil. Experience has shown that as consumption has decreased, fuel price has decreased and the percentage of imported oil has increased. Therefore, conservation in the U.S., as a single strategy, will likely solidify the control of the large Middle East oil producers. If there is a desire to increase domestic oil production or reduce oil imports, then the price of fuel (or imported oil) must be high enough to support the goal. Stable domestic production will only come about with higher oil prices. Without higher prices, the cost of domestic production will remain uneconomical when compared to the global market.

Another key point raised in S. 341 is the consideration of the ability of the manufacturer to incorporate new technology in its product line. The motor vehicle industry is highly complex, with many differences between manufacturers. Some have already applied many fuel saving technologies. The time between model turnover for manufacturers ranges between three and fifteen years. A requirement to rapidly incorporate "new technology" can more easily be accommodated by some manufacturers than others depending on the stage of their new design process. This underscores the difficulty of overlaying some "simple" requirement on the entire industry.

S. 341 proposes to remove the cap (established in Section 513(g) of the Motor Vehicle Information and Cost Savings Act) on fuel economy credits that a manufacturer can gain for production of alternatively fueled vehicles. If the broad national goal is to reduce reliance on foreign oil, then any incentive for vehicles to be produced that can run on other fuels should be encouraged. Vehicles that can switch fuels, if present in a large enough part of the fleet, would provide enhanced energy security to the extent that other non-petroleum based fuels could be made available.

The question of the safety impact of downsizing the fleet was raised by Senator Murkowski. All passenger cars produced today must meet the same Federal Motor Vehicle Safety Standards regardless of their size and improvements in safety are continually being made. Although it is generally true that in a two-vehicle crash, the larger car would have the advantage due simply to the laws of physics, there is no simplistic straight line relationship that can be drawn between vehicle size and safety. Each crash situation is different and highly dependant on the driver.

We appreciate the thoughtful attitude of the Committee in considering a variety of alternatives and its consideration of consumer demands on the ability of manufacturers to achieve CAFE levels. We encourage the Committee to seek an outcome that is fair and equitable to all consumers and manufacturers. AIAM members may be providing additional comments to the Committee.

Appendix II—Responses to Additional Questions (Mar. 20)

TECHNOLOGY ASSESSMENT BOARD
GEORGE E. BROWN, JR., CALIFORNIA, CHAIRMAN
TED STEVENS, ALASKA, VICE CHAIRMAN
EDWARD M. KENNEDY, MASSACHUSETTS
ERNEST F. HOLLINGS, SOUTH CAROLINA
CLAIBORNE PELL, RHODE ISLAND
ORRIN G. HATCH, UTAH
CHARLES E. GRASSLEY, IOWA
MORRIS K. UDALL, ARIZONA
JOHN D. DINGELL, MICHIGAN
CLARENCE E. MILLER, OHIO
DON SUNDQUIST, TENNESSEE
AMO HOUGHTON, NEW YORK
JOHN H. GIBBONS

Congreſs of the United States
OFFICE OF TECHNOLOGY ASSESSMENT
WASHINGTON, DC 20510-8025

JOHN H. GIBBONS
DIRECTOR

April 11, 1991

Mr. J. Bennett Johnston
Chairman
Committee on Energy and
Natural Resources
United States Senate
Washington, D.C. 20510-6150

Dear Mr. Chairman:

I am pleased to forward OTA's response to Senator Wallop's questions on our March 20, 1991 testimony, which you sent to us in your letter of March 26. Thank you for giving us the opportunity of testifying before the Committee.

Sincerely,

Steve Plotkin
Steve Plotkin
Senior Associate

RESPONSE TO QUESTIONS FOR THE OFFICE OF TECHNOLOGY ASSESSMENT (OTA)
FROM SENATOR MALCOLM WALLOP (R-WY)
CAFE PROVISIONS OF S. 341
March 20, 1991 (9:30 a.m.)

1. *The Administration has estimated that energy demand and supply initiatives can achieve comparable benefits under a balanced national energy strategy. By their estimates by the year 2000, oil consumption can be reduced by 1.3 million barrels per day and domestic oil production can be increased by 1.8 million barrels per day. By the year 2010, oil consumption can be reduced by 3.4 million barrels per day and domestic oil production can be increased by 3.8 million barrels per day.*

Would you agree with these estimates?

The Administration's estimates are based on a comprehensive study and deserve a comprehensive review. OTA has not done such a review, and I am comfortable only with commenting on a few important aspects of the estimates with which I am familiar. However, I should first note that the Administration's estimates are relative to *projections* of oil use and production without new initiatives, *not* relative to today's use and production. For example, the Administration projects oil consumption to actually rise by 2000 relative to today; they estimate that consumption will be reduced by 1.3 million barrels per day by 2000 *compared to what it would otherwise have been.*

The NES envisions a 14 percent improvement (relative to the base case) in fleet passenger vehicle efficiency by 2010 and a 45 percent improvement by 2030, purely through increased R&D. Frankly, we view this as astonishingly optimistic without some degree of market or regulatory pull, given the worldwide nature of the auto market and the high level of R&D in improved efficiency occurring worldwide already.

A significant portion of the Administration's projected increase in domestic oil production comes from developing the Arctic National Wildlife Refuge. The estimate includes 870,000 barrels/day from ANWR by 2005, "based on conservative estimates." OTA has examined potential ANWR production in detail (Office of Technology Assessment, Oil Production in the Arctic National Wildlife Refuge: The Technology & the Alaskan Oil Context, OTA-E-394, February 1989). Based on our analysis, we believe that 870,000 barrels/day represents a reasonable peak production, though 2005 seems a few years early to achieve this peak (actually, I have been told by DOE that the assumed peak was in 2001, which is very early). It is not clear, however, whether the 870,000 figure is the *actual* peak production or the "risked" production (that is, actual production multiplied by the probability that production will occur). According to Appendix C of the NES report, the 870,000 figure is "based on the risked mean resource level." If this is so, the production figure seems much too high, because the risked mean resource is less than 2 billion barrels of oil, much too low to support a production rate this high.

On the other hand, if the 870,000 figure is meant to be the actual production, we believe it is misused in the analysis. There is only a 46 percent chance of developing ANWR successfully. In our opinion, a conventional national analysis of production from multiple areas or strategies should use ANWR's expected value of production -- 400,000 barrels/day, or 46 percent of 870,000 barrels/day rather than the conditional value of 870,000 barrels/day. We understand (personal communication, Eric Petersen, DOE, 3/29/91) that DOE used the conditional value in its analysis, and we consider this to yield an overoptimistic estimate of production.

2. *Any analyses of the feasibility of meeting any specified automotive fuel economy must of necessity assume retention of both the Tier I and Tier II the emission standards contained in the 19909 Clean Air Act Amendments.*

    a. *In your analysis, what assumption do you make with regard to Tier I emission standards?*

We have assumed that the Tier I standards are met.

    b. *What assumption do you make with regard to Tier II emission standards?*

We do not account for compliance with Tier II standards.

    c. *Would you agree that manufacturers must plan for the Tier II emission standards?*

Yes.

d. *What effect would compliance with Tier II emissions standards have on your estimates of feasible automobile fuel economies in model year 1996 and 2001?*

The standards may have some adverse effect on fuel economy, but they may alternatively promote new engines or alternative fuels that reduce oil use. There are insufficient data to estimate this effect. Currently, there are several technologies being considered, with potential fuel economy penalties ranging from none to 4 percent.

3. *The current CAFE debate centers on defining the maximum feasible average fuel economy for automobiles and light-duty trucks. When determining technical feasibility,*

a. *What consideration is given to economic feasibility from the standpoint of the consumer? For example, what is the relationship between economic feasibility as the term is used and cost-effectiveness from the standpoint of the new car purchaser?*

The term economic feasibility is used but not defined in the proposed legislation (S.341), so we cannot answer precisely unless the terms are defined. The OTA/EEA analysis selects technology based partly on an examination of its cost-effectiveness to the consumer over a selected vehicle lifetime using a selected discount rate (that is, we examine the ability of the technologies to save enough fuel over the vehicle lifetime to pay for the added front end costs). The product plan scenario is defined assuming a 4 year lifetime and a 10 percent discount rate.

b. *What consideration is given to the financial capability of a given manufacturer to incorporate a technically achievable technology within its total new car product line?*

The financial capabilities of specific manufacturers are not explicitly examined. We note, however, that the global trade in automobiles, the ready purchase of major components (e.g., Chrysler's use of Mitsubishi engines), and the growing number of joint ventures (Ford/Mazda Escort and Probe, GM/Toyota Geo Prizm) allow incorporation of new technologies without self-development. In other words, companies can choose to outsource development of a new technology, reducing their front-end expenditures and risk at the potential cost of added per-unit component costs.

c. *In other words, when determining feasibility from the standpoint of the manufacturer, what consideration is given to the time between when a manufacturer is able to introduce a new technology on one vehicle in its product line and when the given manufacturer can apply that technology to its total product line?*

In our analysis, full technology penetration is delayed long enough to allow a normal debugging period. For scenarios that presume normal industry operations, penetration timing is also dependent on other factors, e.g. the time needed to recoup front-end investment costs for predecessor designs.

4. *In your analysis of what fuel economy standard is achievable in a given model year, what consideration, if any, is given to the economic practicability of a given manufacturer or group of manufacturers having the necessary financial resources to meet a given standard?*

We do not explicitly consider the financial resources of the weaker manufacturers. As I discussed in the answer to question 3b, the easy availability of joint ventures and extensive outsourcing of major components mitigates somewhat our concerns about the financial resources of one or a few manufacturers to develop new technologies. Although it is true that extensive redesign of models is capital intensive, all manufacturers *must* redesign their model lines according to a reasonable schedule or risk technical obsolescence and rapid loss of market share. Our max technology scenarios, because they envision earlier-than-usual retirement of model lines, would put strong financial pressure on all companies, and Congress should consider the risks to the weaker companies in selecting an appropriate standard.

5. *On pages 6 and 7, you state that "the fuel economy penalty associated with new emission and safety standards is dependent in part on which compliance strategies are selected" by a manufacturer. You suggest, on page 6, that if the standard becomes a "critical constraint" Congress could establish a standard of between 0.8 and 1 miles per gallon higher than the "production plan" value of 29.3 miles per gallon.*

   a. *If the standard is a "critical constraint" wouldn't you want to set the standard below the "production plan" for example at 28.3 miles per gallon? Would you comment further.*

What I meant in these statements is that, if a new fuel economy standard put significant pressure on the automakers (that is, became a "critical constraint"), the tradeoffs they made in selecting a strategy to comply with emission regulations would change. In the next few years, most companies should be able to comply with the current 27.5 mpg CAFE standard without a great deal of difficulty; when they select an emissions compliance strategy, they have some room to trade off any fuel economy penalties associated with a particular compliance strategy against other attributes (cost, driveability, performance). In other words, they might choose a strategy that was relatively low cost but had a moderate fuel economy penalty. They might choose a different strategy with lower fuel economy penalty but higher costs *if* the fuel economy standard were raised.

b. *What actions would a manufacturer likely take to meet this "critical constraint?"*

There are compliance approaches available to the manufacturers -- for example, increasing the rhodium content of vehicle catalyst systems -- that would allow a more stringent nitrogen oxide standard to be met with a relatively small fuel economy penalty, but at an added cost over alternative approaches.[1]

---

[1] Sierra Research, Inc., The Feasibity and Costs of More Stringent Mobile Source Emission Controls, prepared for the Office of Technology Assessment, January 20, 1988. The report estimates a cost per vehicle of $139 to achieve an 0.25 grams/mile standard for non-methane hydrocarbons and an 0.4 g/mi standard for NOx with no fuel economy penalty, and no *foregone* fuel economy improvements. The technology involved is an increase in rhodium loadings by 0.5 grams/vehicle in the exhaust catalyst and the addition of a bypassable start catalyst. Another OTA contractor -- Energy and Environmental Analysis, Inc. -- believes that satisfaction of the above standards would *at least* cause some future fuel economy improvement to be foregone (K.G. Duleep, Energy and

6. *If a manufacturer were faced with a "critical constraint" that would not permit it to meet the applicable standards.*

   a. *What gaming would be possible? For example, could the manufacturer purchase more efficient vehicles from a foreign affiliate and rebadge the vehicles to raise its fleet average above the standard?*

   OTA has not yet examined gaming possibilities open to automakers.

   b. *Could a manufacturer rebadge vehicles purchased from a competitor?*

   Ditto.

7. *In your "production plan" scenario for model year 2001, you assume $1.33 a gallon gasoline in 1987 dollars.*

   a. *How does your estimate of 31.9 miles per gallon for domestic fleets change if the price is, let us say, 20 cents more, or 20 cents less?*

As a rule of thumb, a change in gasoline price of $.20/gallon will yield an eventual 0.4 mpg change in fuel economy of the same sign (that is, a higher gasoline price yields higher mpg) from changes in the types of technologies used on new vehicles. In addition, consumer will shift their vehicle purchases to smaller engines and smaller cars, or vice versa, if gasoline

---

Environmental Analysis, Inc., personal communication).

prices change. This latter result is not linear with price; based on recent trends, a $.20/gallon increase (decrease) in gasoline prices may yield an increase (decrease) in fuel economy of 0.2 mpg from this cause, yielding a total 0.6 mpg shift.

b. *If you assume $1.33 a gallon gasoline under the "maximum technology" case, what would be your estimate for the domestic and total fleets in miles per gallon?*

The maximum technology case is defined as technology addition without consideration of price. At $1.33/gallon, the max tech case becomes identical to the product plan except for the assumption of a rollback to 1987 levels of size and performance, which adds an additional 2 mpg.

8. *Manufacturers can achieve fuel economy credits for producing alternative fuel vehicles.*

a. *Isn't this in effect gaming the system?*

It is, in a sense, Congressionally-mandated gaming. However, if the alternative fuel-capable vehicles do use the fuel and thereby reduce gasoline use, the oil displacement objective of CAFE legislation will have been met. In this case, "gaming" might be viewed as merely a means of allowing a more flexible response to a policy objective.

b. *With some alternative fuels there is an actual loss of efficiency in Btu's per mile driven compared to gasoline. By providing credits for such alternative fuels are we not being hypocritical?*

Not necessarily. If our primary goal is to replace oil-based fuels, it is perfectly reasonable to substitute 1000 Btu's of coal for 500 of oil. This is also true if our goal is to reduce urban hydrocarbon emissions. On the other hand, if our primary goal is to reduce global warming, this would be a disaster. OTA's recent report on alternative fuels (Office of Technology Assessment, Replacing Gasoline: Alternative Fuels for Light-Duty Vehicles, OTA-E-364, September 1990) concludes that none of the alternative fuels available within the next decade or two will significantly help efforts to reduce greenhouse emissions.

c. *If the alternative fuels have to be imported, are we not acting counter to our objective of enhancing energy security?*

Our alternative fuels report discusses the energy security implications of alternative fuels in detail. We conclude that there may be some important security benefits even if we have to import the fuels, because most are natural gas-based, and the natural gas resource base is less developed and more dispersed than the oil resource base.

9. *If credit trading or purchase between manufacturers were permitted,*

a. *Wouldn't this increase the opportunities for gaming the system?*

We would define gaming as including only those measures that would help automakers to comply with fuel economy *standards* without actually improving *actual fleet fuel economy*. Credit trading and inter-company purchases might allow some gaming, but they also could improve the overall fleet fuel economy. The result depends on the precise circumstance. Our initial reaction to credit trading and inter-company purchases is a positive one: they will add *flexibility*, which is almost always welcome in a regulated system.

b. *Would foreign or domestic manufacturers benefit from credit trading?*

Both foreign and domestic manufacturers would benefit from credit trading *except* to the extent that a regulated system without such trading grants an unfair advantage to one or the other. With a uniform percentage increase-type standard, OTA concludes that the domestic manufacturers will have more technological "headroom" -- that is, the availability of more technological options, and an easier task -- than the Japanese. Credit trading would reward the domestics with cash if they used all their options and managed to go beyond their numerical standards; and it would reward the Japanese by allowing them to comply with their standards even though they might not be capable of reaching them with technology alone.

10. *What effect have existing CAFE standards in the United States had on per capita fuel consumption? And on vehicle miles driven? Would you expect this trend to be effected by any new CAFE standards?*

This question can only be answered by knowing what per capita fuel consumption and vehicle miles driven *would have been* had the CAFE standards never been passed. Needless to say, there's lots of controvery on this point, with the auto manufacturers claiming that CAFE really did little to improve auto fuel economy, and that most of the actual improvement resulted from higher oil prices.

Let me try to put these issues into perspective:

In 1975, total U.S. gasoline usage was 6.67 million barrels per day. By 1988, this had grown to 7.31 million barrels per day, with increased vehicle efficiency being outraced by increased demand for travel. However, had efficiency remained the same during this period, 1988 gasoline consumption *would have been* about 9.2 million barrels per day, since automobile miles driven had gone up 38 percent during this period. If one wanted to be simple-minded, it could be claimed that CAFE standards were responsible for the difference of about 1.9 million barrels per day. They certainly were responsible for *some* of the savings, but it's not clear how much.

Regarding CAFE's effect on vehicle miles driven: most analysts agree that increased vehicle efficiency leads to more driving, so CAFE standards, to the extent that they *were* effective in improving efficiency, probably led to increased vehicle miles driven. There's some argument about the size of the effect, but it's likely that about 10 percent of the potential fuel savings from increased efficiency is lost by increased driving. Between 1975 and 1990, average automobile fleet efficiency increased by about 47 percent (from 9293 btu/vehicle mile to 6275 btu/vehicle mile according to Oak Ridge National Laboratory, Transportation Energy Data Book: Edition 11, ORNL-6649, January 1991.); accordingly, we might expect vehicle miles traveled to have increased by about 4.7 percent because of this increased efficiency, or about 64 billion extra automobile miles (based on 1988 auto mileage of 1.429 trillion vehicle miles, according to the Motor Vehicle Manufacturers Association). Not all of this was caused by CAFE standards, since not all efficiency gains were caused by CAFE standards.

If new standards are passed, and I'm still working in this crazy field 15 years from now, I expect to be dealing with the same trends (that is, higher fuel economy causing increases in travel) and the same arguments about the effects of CAFE standards on fleet fuel economy and travel then as now.

11. *One of the objectives of the Administration's National Energy Strategy and S. 341 is to foster the use of alternative fuels such as natural gas in automobiles.*

If fuel efficiency standards foster alternative fuels that require more Btu's per mile driven, is this consistent with the spirit and objectives of CAFE standards?

We refer you to our answer to 8b.

J. BENNETT JOHNSTON, LOUISIANA, CHAIRMAN

DALE BUMPERS, ARKANSAS
WENDELL H. FORD, KENTUCKY
BILL BRADLEY, NEW JERSEY
JEFF BINGAMAN, NEW MEXICO
TIMOTHY E. WIRTH, COLORADO
KENT CONRAD, NORTH DAKOTA
DANIEL K. AKAKA, HAWAII
WYCHE FOWLER, JR., GEORGIA
RICHARD C. SHELBY, ALABAMA
PAUL WELLSTONE, MINNESOTA

MALCOLM WALLOP, WYOMING
MARK O. HATFIELD, OREGON
PETE V. DOMENICI, NEW MEXICO
FRANK H. MURKOWSKI, ALASKA
DON NICKLES, OKLAHOMA
CONRAD BURNS, MONTANA
LARRY E. CRAIG, IDAHO
JOHN SEYMOUR, CALIFORNIA
JAKE GARN, UTAH

BENJAMIN S. COOPER, STAFF DIRECTOR
D. MICHAEL HARVEY, CHIEF COUNSEL
G. ROBERT WALLACE, STAFF DIRECTOR FOR THE MINORITY
GARY G. ELLSWORTH, CHIEF COUNSEL FOR THE MINORITY

United States Senate
COMMITTEE ON
ENERGY AND NATURAL RESOURCES
WASHINGTON, DC 20510-6150

April 12, 1991

Mr. K. G. Duleep
Energy and Environmental Analysis
1655 N. Fort Meyer Drive
Suite 600
Arlington VA 22209

Dear Mr. Duleep:

I would like to thank you for your recent appearance as a contractor to the Office of Technology Assessment at the hearing held by the Committee on Energy and Natural Resources on March 20, 1991. Your time and effort to provide the Committee with your views concerning the provisions of S. 341 pertaining to Corporate Average Fuel Economy (CAFE) are greatly appreciated.

In order to assist the Committee in its consideration of this pending legislation, I am attaching additional questions for inclusion in the hearing record. I would appreciate it if you would provide answers to these questions as soon as possible.

Again, thank you for your testimony. I look forward to receiving your additional comments. If you have any questions concerning this request, please contact Karl Hausker of the Committee staff (202-224-3329).

Sincerely,

J. Bennett Johnston

J. Bennett Johnston
Chairman

JBJ/kah

QUESTIONS FOR K. G. DULEEP

1. How would the estimates of domestic and import fuel economy for cars for the 2001 "maximum technology scenario" change if one held size and performance at 1990 levels?

   a. What would be the average change in price per car be under this scenario?

   b. What would be the average change in car weight be under this scenario?

2. How would the estimates of domestic and import fuel economy for cars for the 2001 "maximum technology scenario" change if one assumed: 100% market penetration of weight reduction, 100% penetration of drag reduction, and 2-stroke engines replacing all 4-stroke engines without intake valve control, and 1990 size and performance levels?

   a. What would be the average change in price per car under this scenario?

   b. What would be the average change in car weight under this scenario?

3. How would the estimates of domestic and import fuel economy for cars for the 2001 "product plan scenario" change if size and performance were held at 1990 levels?

   a. What would be the average change in price per car be under this scenario?

   b. What would be the average change in car weight under this scenario?

4. Please describe the factors underlying the weight changes in the three scenarios above. Do some factors involve reduction of materials? Do other factors involve substitution of lighter materials for heavier materials? Describe the effect, if any, of these weight changes on the safety of the cars under these scenarios.

5. Please provide in writing your most recent estimates of fuel economy potential for domestic light trucks in 1996 and 2001 (product plan and maximum technology scenarios). When you update this analysis, please provide a copy to the Committee.

   a. Have you conducted any analysis of fuel economy potential for imported light trucks? If so, please provide a copy to the Committee.

   b. Are you aware of any other published studies of fuel economy potential for imported light trucks? If so, please provide the citations.

ENERGY AND ENVIRONMENTAL ANALYSIS, INC.
1655 NORTH FORT MYER DRIVE • ARLINGTON, VIRGINIA 22209 FAX: 703/528-5106 TEL: 703/528-1900

May 7, 1991

Senator Bennett Johnston
Chairman, Committee on Energy and Natural Resources
United States Senate
Washington, DC 20510

Dear Sir:

I am writing in response to the questions posed to me by the Senate Energy Committee Staff following the hearing held on S.341 pertaining to Corporate Average Fuel Economy.

The answers to question 1, 2 and 3 are presented in Table 1 in the attachment to this letter. The fuel economy numbers are supported with more detailed documentation in the attached tables 2 to 7. Your question 3 requests an estimate of the "product plan" scenario if size and performance were held constant at 1990 levels. Of course, freezing size and performance at 1990 levels departs from the "product plan" and so the terminology may cause some confusion. As a result, I have assumed that the question relates to the technologies adopted and not the product plan itself as the terminology is commonly understood.

Answer to Question 4 In the maximum technology scenario, weight is reduced by aggressive material substitution, and also as a result of conversion to front wheel drive. Depending on the specific component, different materials can be used to replace steel. For example, Sheet Molding Compound (SMC) can be used to replace the hood and fenders, Injection Molded Plastics for the bumper and fuel tank, high strength low alloy steel in load bearing structures, aluminum for wheels and the cylinder head/engine block. Material substitution is projected to occur in 80 percent of all cars by 2001, with the other 20 percent representing carryover body lines in that year or products that already incorporate many of the above materials. Front-wheel drive is also expected to be incorporated into designs replacing the few older rear-wheel drive designs still left in the marketplace. (These designs accounted for 25 percent of the market in 1988, and 15 percent in 1990). Weight reduction due to front-wheel drive is expected to be significant, averaging 400 lbs per rear wheel drive car, and is largely as a result of the improved packaging efficiency of front-wheel drive, as well as conversion to unit body construction.

The weight reductions are partially offset by the weight increase due to the installation of air bags and side restraints. The weight increase will be approximately 75 to 95 lbs depending on car size, according to DOT. It should be noted that many 1990 vehicles already feature air bags and some can meet the side intrusion standards with no design changes. These changes will contribute to a net benefit in safety.

The impact on safety due to material substitution and consequent weight reduction is expected to be small or non existent due to the fact that (1) newer lighter materials will be as strong as current materials and (2) the overall length and width of the car will be unchanged. Front wheel drive conversion is expected to make the exterior dimension of vehicles smaller, making them less safe, but front-wheel drive vehicles offer better traction in poor weather conditions making them more safe; it is difficult to estimate how well the two factors counteract each other. EEA would look to ongoing analysis being conducted by DOT to answer these questions.

Answer to Question 5 - The analysis for light trucks that was initially performed in 1988 has not received the level of scrutiny and subsequent updates that were performed for the analysis of car fuel economy. Based on preliminary update of the 1988 analysis, I can report the following numbers for domestic manufacturers. These estimates assume 1990 levels of performance, but there are some mix changes assumed due to the projected increase in popularity of mini-vans that are factored into the estimates.

	Product Plan	Maximum Technology
1996	21.2	21.7
2001	23.4	26.0

We have not evaluated the potential 1996/2001 fuel economy for import light trucks but can state the percent increases in fuel economy from the 1990 baseline are likely to be smaller than those for domestic light trucks. We are not aware of any other study on light truck fuel economy in the public domain.

I hope that the attached tables are self explanatory. If any questions arise, please feel free to contact me.

Yours sincerely,

K.G. Duleep
Director of Engineering

KGD:gyw

TABLE 1

ANSWERS TO QUESTIONS 1, 2, AND 3

Scenario	Manufacturer	F/E	Change in Weight **	Change in Cost (1988$)
1) Max Technology 2001	Domestic	35.7	-250 lbs.	928
	Import	37.9	-187 lbs.*	650*
2) Max Technology 2001 and Modifications	Domestic	36.9	-350 lbs.	980
	Import	39.4	-268 lb*	698*
3a) Product Plan 2001	Domestic	31.6	+22 lbs.	477
	Import	34.2	+140 lbs.*	442*
3b) Adjusted product plan w/size and performance at 1990 levels	Domestic	32.9	-105 lbs.	477
	Import	35.1	-54 lbs.*	442*

Weight and cost changes relative to 1990.

* Values for typical Japanese car.

** Negative sign implies weight decrease.

TABLE 2
1995 DOMESTIC MANUFACTURERS FUEL ECONOMY
PRODUCT PLAN CASE

Technology	F/E Gain (%)	Penetration Increase from 1987 (%)	1995 Penetration	Fleet F/E Gain
Front Wheel Drive	10.0	12	86	1.20
Drag Reduction (C_D ~0.33)	2.3/4.6**	65/15	~100	2.19
4-speed Automatic Transmission	4.5	40	80	1.80
Torque Converter Lock-up	3.0	20	80	0.60
Electronic Transmission Control	0.5	80	80	0.40
Accessory Improvements	0.5	80	N/M	0.40
Lubricant/Tire Improvements	1.0	100	100	1.00
Engine Improvements				
- Advanced Pushrod	3.0	(40)	(30)	1.20
- Overhead Camshaft	3.0	45	69	1.35
- Roller Cam Followers	2.0	40	95	0.80
- Low Friction Pistons/Rings	2.0	80	100	1.60
- Throttle Body FI	3.0	12	40	0.36
- Multi-point FI (over throttle body)	3.0	12	60	0.36
4 valves per cylinder engine				
- 4 cylinder replacing 6*	8.0	18	18	1.44
- 6 cylinder replacing 8*	8.0	12	12	0.96
Total F/E Benefit				15.66%

Number in parenthesis for advanced pushrod indicates 45 percent of pushrod engines replaced by OHC engines.

N/M: Not meaningful.

* 1987 distribution: 20.5% V-8, 29.5% V-6, 50% 4 cylinder
** Drag reduction for large/luxury cars from C_D = 0.42 baseline.

TABLE 3
DOMESTIC MANUFACTURERS

FUEL ECONOMY UNDER ALTERNATIVE SCENARIOS

1987 Fuel Economy:	26.7 MPG
1995 Fuel Economy w/o size or performance increase	30.9 MPG
Size/weight Increase	-1.4 MPG
Performance Increase	-0.7 MPG
Effect of Emission/Safety Standards	-0.8 MPG
1995 Product Plan F/E	28.0 MPG

1995 MAX. TECHNOLOGY CASE

1995 Fuel Economy w/o size or performance increase	30.9 MPG
Effect of Emission/Safety Standards	-0.8 MPG
Replace all TBI of with MPFI	+0.32 MPG
Increase OHC penetration to 80%	+0.08 MPG
Size/Weight increase to '90 (est.)	-0.60 MPG
Performance Increase to '90 (est.)	-0.40 MPG
1995 Max Tech Case at 1990 size and performance	29.5 MPG

TABLE 4
DOMESTIC MANUFACTURERS' POTENTIAL U.S. FUEL ECONOMY IN 2001 UNDER ALTERNATIVE SCENARIOS

	Fuel Economy Benefit	Product Plan		Max. Technology	
		Mkt. Pen 1995 - 2001	F/E	Mkt. Pen 1995 - 2001	F/E
Weight Reduction	3.3/6.6	80	2.64	80	5.28
Drag Reduction	1.15/2.3	80	0.92	80	1.84
Intake Valve Control[*]	6.0	40	2.40	70	4.20
Overhead Cam Engines	3.0	30	0.90	30	0.90
6 cyl./4V replacing 8 cyl.	8.0	4	0.32	8	0.64
4 cyl./4V replacing 6 cyl.	8.0	6	0.48	12	0.96
4 cyl./4V replacing 4 cyl.	5.0	10	0.50	50	2.50
Multi-point fuel injection (over TBI)	3.0	40	1.20	40	1.20
Front wheel drive	10.0	5	0.50	13	1.30
5-speed auto. transmission[**]	2.5	20	0.50	40	1.00
Continuously variable transmission[*]	3.5	15	0.52	30	1.05
Advanced engine friction reduction	2.0	100	2.00	100	2.00
Electric Power Steering	1.0	5	0.05	30	0.30
Tire Improvements	0.5	100	0.50	100	0.50
Total F/E Benefit (%)			13.03[*]		22.67[*]
2001 mpg			31.65		35.7

Note: Product plan scenario starts from a different 1995 base than the maximum technology scenario, which holds performance and size constant at 1990 levels.

---

[*] Synergy of intake valve control with 5-speed/CVT transmisions results in a loss of 2 percent in fuel economy in vehicles featuring both technologies.

[**] Over 4-speed auto transmission with lock-up.

TABLE 5
1995
IMPORT MANUFACTURERS
FUEL ECONOMY
PRODUCT PLAN CASE

Technology	F/E Gain	Penetration Increase from 1988	1995 Penetration	Fleet F/E Gain
Front Wheel Drive*	5.0	3	90	0.15
Drag Reduction I	2.3	80	~100	1.84
4-speed Auto. Trans.	4.5	16	47	0.72
Torque Converter LU	3.0	9	53	0.27
Elec. Trans. Control	0.5	44	47	0.22
Accessory Improvements	0.5	80	N/M	0.40
Tires/Lubricants	1.0	100	100	1.00
Roller Cam Followers	2.0	50	50	1.00
Low Friction Piston/Rings	2.0	80	100	1.60
Throttle Body FI**	2.0	25	20	0.50
Multi-Point FI	3.0	20	75	0.60
4 Valves/Cylinder	5.0	20	44	1.00
TOTAL F/E BENEFIT (%)				9.30

* F/E gain based on conversion of unit body RWD vehicle.

** Benefit of TBI is lower than for domestic cars because air pumps are not used in carburetted import cars.

TABLE 6
1995
IMPORT MANUFACTURERS
FUEL ECONOMY
UNDER ALTERNATIVE SCENARIOS

Product Plan Case	
1988 Fuel Economy	31.4 MPG
1995 Fuel Economy without size or performance increase	34.32 MPG
Size/Weight increase	-1.66 MPG
Performance Increase	-0.90 MPG
Effect of Safety/Emission Std.	-0.94 MPG
1995 Product Plan F/E	30.82 MPG
Maximum Technology Case	
1995 Fuel Economy without size or performance increase	34.32 MPG
Effect of Safety/Emission Standard	-0.94 MPG
Replace all TBI with MPFI	+0.23 MPG
Increase roller cam penetration to 80%	+0.19 MPG
Size/weight increase to 1990	-1.08 MPG
Performance increase to 1990	-0.68 MPG
1995 Maximum Technology F/E	32.04 MPG

TABLE 7
IMPORT MANUFACTURERS
FUEL ECONOMY IN 2001

Technology	F/E Benefit	Product Plan		Maximum Technology**	
		Mkt. Pen.	F/E Gain	Mkt. Pen.	F/E Gain
Weight Reduction	3.3/6.6	90	2.97	90	5.94
Drag Reduction	1.15/2.3	80	0.92	80	1.84
Intake Valve Control*	6.0	30	1.80	60	3.60
4-Valve Engine	5.0	10	0.50	50	2.50
Multi-point FI	3.0	25	0.75	0	0.00
Front Wheel Drive	10.0	0	0.00	5	0.50
5-Speed Auto. Trans.	2.5	6	0.15	12	0.30
CVT	3.5	26	0.91	40	1.40
Advanced Friction Reduction	2.0	100	2.00	100	2.00
Electric Power Steering	1.0	10	0.10	35	0.35
Tire Improvements	0.5	100	0.50	100	0.50
TOTAL F/E BENEFIT (%)			11.00*		19.68*
2001 MPG			34.2		37.9

* Synergy with 5-spd auto-transmission/CVT results in 2 percent loss in F/E when both technologies are used in the same vehicle.

** Maintains 1990 level of size/performance.

CHRYSLER
MOTORS

R R Boltz
Vice President
Product Strategy and
Regulatory Affairs

April 15, 1991

Mr. Karl Hausker
Committee on Energy and Natural Resources
United States Senate
Washington, DC 20510-6180

Dear Mr. Hausker:

Chrysler is pleased to respond to Chairman Johnston's request for comments to additional questions from Committee members regarding Title XI of S.341. Our comments are attached. The responses to Questions 1-4 are the same as those contained in Chrysler's response to questions dated March 20, 1991.

We expect the study underway at National Academy of Sciences will provide the type of information needed to assist CAFE rulemaking efforts. We urge the Committee to wait for Phase I of the study in June, 1991 before taking further actions to modify S.341.

Best Regards,

Ron

R. R. Boltz

/ja

Attachment

cc: The Honorable J. Bennett Johnston
The Honorable Malcolm Wallop

DOC19-BMB32

Chrysler Corporation
12000 Chrysler Drive
Highland Park MI 48288-0857

Chrysler Response to Additional Questions from Senator Malcolm Wallop (R-WY)
Re March 20, 1991 Hearing on Subtitle A of Title XI of S.341

April 3, 1991

Question 1. The current CAFE debate centers on defining the maximum feasible average fuel economy for automobiles and light duty trucks. When determining technical feasibility,

a. What consideration is given to economic feasibility from the standpoint of the consumer? For example, what is the relationship between economic feasibility as that term is used and cost-effectiveness from the standpoint of the new car purchaser?

b. What consideration is given to the financial capability of a given manufacturer to incorporate a technically achievable technology within its new car product line?

c. In other words, when determining feasibility from the standpoint of the manufacturer, what consideration is given to the time between when a manufacturer is able to introduce a new technology on one vehicle in its product line and when the given manufacturer can apply that technology to its total product line?

Response 1a. We should be careful to distinguish technological feasibility from economic practicability. It may be technologically feasible to put 100,000 people on the moon. It is not economically practicable presently.

From a consumer's viewpoint, technology first must be affordable; and, second, economic. In other words, fuel efficient technologies must fit the consumer's pocketbooks, and result in savings at least equal to the total cost of the technology during the period of ownership. Here again, the price of fuel plays a role.

Response 1b. Competitive pressures tend to accelerate the introduction of fuel efficient technologies, provided these technologies are affordable and economic. High cost solutions to low cost problems meet little success in a competitive market.

Successful manufacturers generally attempt to solve problems for consumers at the lowest possible cost--subject to the very real constraints in applying available human and financial resources.

Response 1c. The approach to solving consumer problems, and the time frame of resolution, varies for each manufacturer. The availability of technology, the breadth of the product lines

Question 2. What is the added cost if any of the various technological improvements such as variable valve control, fuel injection, etc, to the consumer in terms of frequency and cost of repairs?

Response 2. If technological improvements are introduced in an orderly manner, the frequency and cost of repairs will not be compromised.

Forcing technological breakthroughs on a rigid timetable, however, is not an orderly process. Technology forcing creates not only the risk of increased frequency and cost of repairs. It creates the risk of customer dissatisfaction, resulting in lost opportunity for repeat sales in the future.

Question 3. What effect has existing CAFE standards in the United States had on per capita fuel consumption? And on vehicle miles driven?

Response 3. Existing CAFE standards have no direct effect on fuel consumption. The benefits of higher fuel economy are offset by increased driving. And CAFE does nothing to encourage conservation by the American public.

The most important factor affecting per capita fuel consumption and vehicle miles driven appears to be the price of fuel. When fuel prices rose during the 1970s, customers bought more economical cars and drove fewer miles. Now, fuel costs have fallen. Consumers are less concerned about fuel economy when they buy a car, and they are driving more.

Question 4. There are press reports of experimental cars capable of achieving over 50 miles per gallon. Why are the constraints on making such cars available to consumers?

Response 4. Vehicles that achieve 50 mpg are available to consumers today, but they do not satisfy the needs of many car buyers in America. Such vehicles accounted for less than three percent of vehicle sales in 1990.

Press reports of experimental fuel economy vehicles focus on high fuel economy ratings, but do not mention the compromises made to achieve those ratings. Many experimental vehicles and concept cars do not meet U.S. safety and emission standards. And they frequently employ high cost experimental technology that is not suitable for high volume applications.

Question 5. In earlier testimony, Dr. Whitman stated that "Other aspects of the CAFE program have reduced and will continue to reduce fuel savings potential even further." Will you please give some specific examples for the record?

Response 5. Chrysler supports Dr. Whitman's statement that "other aspects of the CAFE program have reduced and will continue to reduce the fuel savings potential even further." For instance, as a result of a fixed standard, the domestic manufacturers have steadily increased their passenger car CAFE level since 1978, while the import manufacturers' passenger car CAFE peaked in 1983, and has decreased since then. At the same time, the market share of the domestic manufacturers has decreased as the import market share has increased. The end result is that there are more import vehicles being sold with lower fuel economy levels, leading to a reduction in fuel savings potential.

Ideally, the percentage increase approach as proposed in S.341 would require all manufacturers to improve their fleet fuel economy. If the original fuel economy standard had used the percentage increase approach instead of a fixed standard, then the CAFE standard would have resulted in greater overall fuel economy improvements.

As Figure 1 shows, the domestic passenger car fleet CAFE increased 41% from 1978 to 1990. At the same time, the import CAFE increased only 10%. If the import manufacturers had been required to increase by 41% too, then their CAFE would average almost 40 mpg in 1990. The shaded area represents lost fuel savings potential.

Question 6. What specific safety concerns do you have with the approach taken by Senator Bryan in S.279?

Response 6. Chrysler will continue to enhance the safety of its vehicle line, small and large passenger cars, as well as light trucks. The problem with S.279 centers on the extreme increases in fuel economy it would require, and the effects of these increases on vehicle size mix. NHTSA has already expressed concern regarding motor vehicle safety if another round of vehicle downsizing to meet extreme CAFE requirements is necessary.

Furthermore, vehicle weight increases for new safety and emissions vehicle hardware planned for the mid-1990s must be offset to avoid a structurally induced reduction of fuel economy. For example, Table 1 shows the actual and anticipated new safety standards for the 1990s. Passive restraint requirements will be met by using airbags, which add almost 30 lbs. to the weight of a passenger car. The Dynamic Side Impact Standards will necessitate a redesign of vehicle side panels with a probable weight penalty of about 10 lbs to passenger cars. In addition, compliance with other anticipated standards, such as rollover protection, pedestrian protection and higher speed impact protection will also increase vehicle weight. As a rule of thumb, the vehicle improvements required to insure compliance with safety standards will add weight to the vehicle. As an example, a 1 percent increase in weight on a midsize vehicle will cause fuel economy to decrease approximately 1 percent.

Question 7. Do you generally support the approach of S.341? What specific recommendations do you make for improvements? Do you have a suggestion for an alternative approach?

Response 7. Chrysler generally supports the concepts outlined in Title XI of S.341. We support an Administrative rulemaking conducted by the Secretary of Transportation to determine the maximum feasible fuel economy level considering economic practicability. In addition, the Secretary should evaluate the effect of other Federal motor vehicle standards on fuel economy, especially as it relates to new or proposed safety and emission standards.

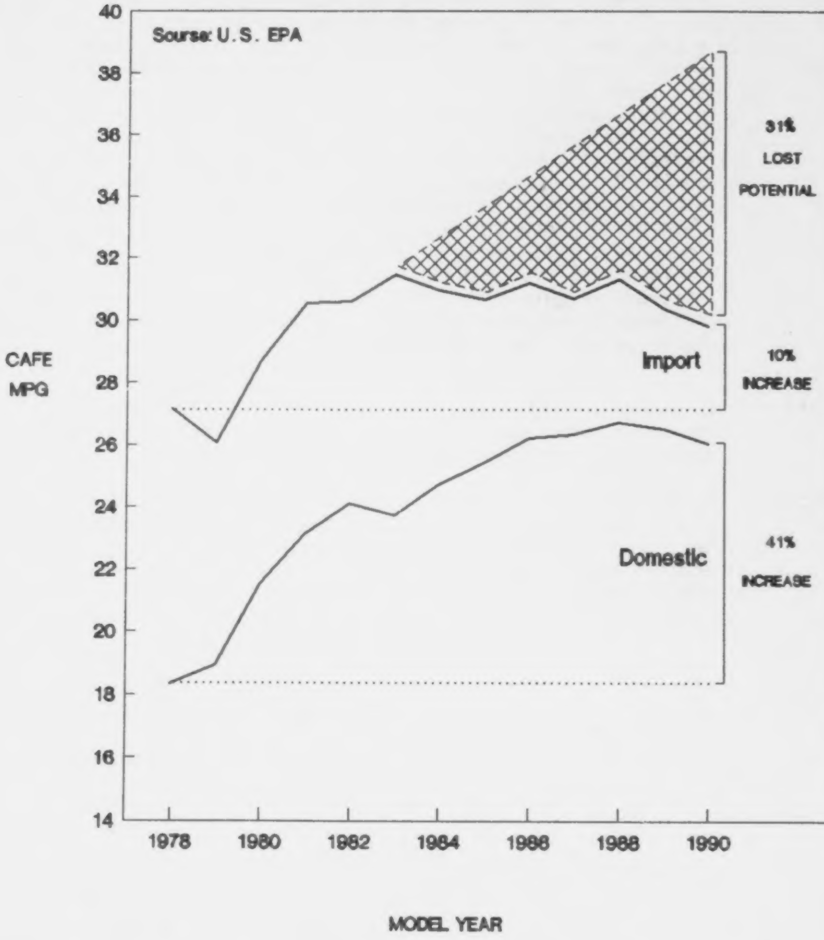
Chrysler also supports the concept of CAFE credit trading, and airbag credit provisions. Provisions of this nature assist manufacturers by ensuring a proper balance between more stringent safety, emissions, and fuel economy regulatory requirements.

Certification & Regulatory Programs
BMB 04/12/91

DOC19 BMB32

FIGURE I

LOST FUEL ECONOMY POTENTIAL
WITH UNIFORM CAFE STANDARD



834105

Table 1

CHRYSLER CORPORATION

Major Motor Vehicle Safety Standards for the 1990s

	Car	Truck
1990	Passive Restraints (100% Drivers)	None
1991	None	None
1992	None	Dynamic Crash Performance Head Restraints Rear Lap-Shoulder Belts Steering Column Displacement
1993	None	None
1994	Passive Restraints (100% RF Pass.) Dynamic Side Impact (10%)	Center High Mounted Stop Lamps Roof Crush Side Door Beams
1995	Dynamic Side Impact (25%)	Passive Restraints (20%)
1996	Dynamic Side Impact (40%)	Passive Restraints (50%)
1997	Dynamic Side Impact (100%)	Passive Restraints (90%)
1998	None	Passive Restraints (100%)

Anticipated Safety Standards for the Late 1990s

Car	Truck
● Rollover Protection	● Rollover Protection
● Pedestrian Protection	● Dynamic Side Impact
● Higher Speed Impact Protection	● Higher Speed Impact Protection
● Head Injury and Ejection Protection	● Head Injury and Ejection Protection

J. BENNETT JOHNSTON, LOUISIANA, CHAIRMAN

DALE BUMPERS, ARKANSAS
WENDELL H. FORD, KENTUCKY
BILL BRADLEY, NEW JERSEY
JEFF BINGAMAN, NEW MEXICO
TIMOTHY E. WIRTH, COLORADO
KENT CONRAD, NORTH DAKOTA
DANIEL K. AKAKA, HAWAII
WYCHE FOWLER, JR., GEORGIA
RICHARD C. SHELBY, ALABAMA
PAUL WELLSTONE, MINNESOTA

MALCOLM WALLOP, WYOMING
MARK O. HATFIELD, OREGON
PETE V. DOMENICI, NEW MEXICO
FRANK H. MURKOWSKI, ALASKA
DON NICKLES, OKLAHOMA
CONRAD BURNS, MONTANA
LARRY E. CRAIG, IDAHO
JOHN SEYMOUR, CALIFORNIA
JAKE GARN, UTAH

BENJAMIN S. COOPER, STAFF DIRECTOR
D. MICHAEL HARVEY, CHIEF COUNSEL
G. ROBERT WALLACE, STAFF DIRECTOR FOR THE MINORITY
GARY G. ELLSWORTH, CHIEF COUNSEL FOR THE MINORITY

United States Senate
COMMITTEE ON
ENERGY AND NATURAL RESOURCES
WASHINGTON, DC 20510-6150

March 26, 1991

Mr. James Olson
Vice President, External Affairs
Toyota Motor Sales, U.S.A.
1850 M Street, N.W.
Washington, D. C. 20036

Dear Mr. Olson:

I would like to thank you for presenting your testimony pertaining to the CAFE provisions of Subtitle A of Title XI of S. 341 at the hearing held by the Committee on Energy and Natural Resources on March 20, 1991. Your time and effort to provide the Committee with your views pertaining to Corporate Average Fuel Economy are greatly appreciated.

In order to assist the Committee in its consideration of this pending legislation, I am attaching additional questions from our Members for inclusion in the hearing record. I would appreciate your sending your responses to Karl Hausker of the committee staf by close of business on April 12, 1991.

Again, thank you for your testimony. I look forward to receiving your additional comments.

Sincerely,

J. Bennett Johnston
Chairman

JBJ/kah

Questions for Mr. James Olson, Vice President, Toyota Motor Sales
Senator Malcolm Wallop (R-WY)
CAFE provisions of S. 341
March 20, 1991 (9:30 a.m.)

QUESTIONS FOR AUTO INDUSTRY PANEL

1. The current CAFE debate centers on defining the maximum feasible average fuel economy for automobiles and light duty trucks. When determining technical feasibility,

   a. What consideration is given to economic feasibility from the standpoint of the consumer? For example, what is the relationship between economic feasibility as that term is used and cost-effectiveness from the standpoint of the new car purchaser?

   b. What consideration is given to the financial capability of a given manufacturer to incorporate a technically achievable technology within its total new car product line?

   c. In other words, when determining feasibility from the standpoint of the manufacturer, what consideration is given to the time between when a manufacturer is able to introduce a new technology on one vehicle in its product line and when the given manufacturer can apply that technology to its total product line?

2. What is the added cost if any of the various technological improvements such as variable valve control, fuel injection, etc., to the consumer in terms of frequency and cost of repairs?

3. What effect has existing CAFE standards in the United States had on per capita fuel consumption? And on vehicle miles driven?

4. There are press reports of experimental cars capable of achieving over 50 miles per gallon. Why are the constraints on making such cars available to consumers?

5. In earlier testimony, Dr. Whitman stated that "Other aspects of the CAFE program have reduced and will continue to reduce fuel savings potential even further.". Will you please give some specific examples for the record?

6. What specific safety concerns do you have with the approach taken by Senator Bryan in S. 279?

7. Do you generally support the approach of S. 341? What specific recommendations do you make for improvements? Do you have a suggestion for an alternative approach?

TOYOTA

Toyota Motor Sales, U.S.A., Inc.
1850 M Street, N.W., Suite 600
Washington, D.C. 20036
(202) 775-1700
(202) 822-0928 Fax

April 12, 1991

The Honorable Malcolm Wallop
United States Senate
237 Russell Senate Office Building
Washington, DC 20510-5001

Dear Senator Wallop:

Thank you for giving Toyota the opportunity to express its views on proposals to amend the existing CAFE programs. This letter responds to the supplemental questions you have asked. I will address them in order.

1. Economic Feasibility. As S.341 is currently drafted, the criteria used to establish the maximum feasible average fuel economy do not take into account payback to the consumer for the added cost of meeting the required standards. Under the uniform percentage increase approach contained in S.341, this issue is highlighted for a company such as Toyota which has already applied high levels of advanced technology in all of its passenger vehicles.

In order to achieve the same percentage increase as another manufacturer which has not applied the same level of technology as Toyota, we would be forced to downsize existing models and employ technology that is currently unproven and very costly. Given this situation, it is unlikely that the customer will save a sufficient amount of fuel during the period of ownership to equal the additional cost to meet the required percentage increase. For this reason, so long as S.341 incorporates the uniform percentage increase approach (as is done in Senator Bryan's bill), Toyota does not believe economic feasibility or cost effectiveness to the consumer can be adequately addressed.

Your question also highlights the problem Toyota would face under the uniform percentage increase approach used in both S.341 and S.279. Due to Toyota's existing use of almost all of the technologies identified by Mr. Duleep in his testimony before the Committee on March 20, we will be faced with the prospect of using even more advanced technology in all of our vehicles without the ability to refine this technology through introduction of one or two lines. To the extent new technology is rushed prematurely into production, cost will increase due to an inability to fully utilize existing equipment. In addition, without adequate lead time for production preparation, overall quality and performance of the new technology could suffer.

This makes the stakes for the forced introduction of commercially unproven technology very high. In other words, the uniform percentage increase approach incorporated into both S.341 and S.279 provides precious little time for companies that already have high penetration of advanced technology to develop and refine even further advances for the future.

2. Cost/Frequency of Repair of New Technologies. Toyota already employs multi-point electronic fuel injection (EFI) in all passenger cars and light-duty trucks. We have had quite good success with this technology, both in terms of its effectiveness to better control combustion (emission control and fuel economy benefits) and reliability. But it has not been without significant increased costs over conventional carburetor technology.

Likewise, Toyota has pioneered the use of multi-valve engines. Toyota began employing this technology in 1985, and today all Toyota passenger cars and vans have multi-valve engines as standard equipment. Other manufacturers have charged as much as $700 for these engines as optional equipment on a limited number of vehicle lines. After using this technology on a large number of vehicles for several years, we see no inherent reliability problems.

Intake valve control technology is still under development at this time. We are not certain that sufficient benefits and reliability can be achieved, so we have no firm plans to introduce this technology at this time.

3. Per Capita Fuel Conservation. We do not know the effect CAFE standards have had on per capita fuel consumption and vehicle miles travelled (VMT), if any. Toyota believes the price of fuel has had a much greater impact on fuel consumption and VMT than CAFE standards. Attachment I demonstrates the relationship between the price of fuel and VMT. It is clear that as the price of fuel increases, VMT decreases, and vice versa.

4. Experimental Vehicles. Before addressing the issue of high-mileage experimental vehicles directly, it is important to make very clear the distinction between prototype vehicles and experimental or concept vehicles. A prototype vehicle is one that is close to production; whereas a concept or experimental

vehicle is typically a hand-built vehicle which incorporates one or more major design or engineering features that will be tested for possible future use in vehicles. However, some ideas from earlier experimental or concept vehicles produced by Toyota and other manufacturers have never been put into production due to technological or production concerns and/or shifting market demands. It should be noted that often the features included in these experimental vehicles take many years before they can be installed in production vehicles. An example of a prototype vehicle is the Lexus vehicle which was displayed at the Detroit Motor Show shortly before it was introduced by the Lexus Division of Toyota Motor Sales, USA, Inc. in the fall of 1989. An example of an experimental or concept vehicle is the AXV vehicle which was displayed at the 1987 Tokyo Motor Show. This distinction should be kept clearly in mind.

Toyota's AXV has been designed to include technologies that maximize fuel economy: a direct injection diesel engine; CVT transmission; use of new light-weight materials, and streamlined styling which results in a coefficient of drag of 0.26. As pointed out above, this is an experimental/concept vehicle, as opposed to a prototype vehicle. In other words, far more research and evaluation must be undertaken before one or all of the advanced concepts incorporated into this vehicle can be utilized in production vehicles. This is the very reason for designing this type of vehicle. The difficulties in incorporating the innovations of AXV into production vehicles are shown in Attachment II.

5. Dr. Whitman's Prior Statement. We are uncertain about what aspects of the existing program Dr. Whitman is referring to. For this reason, we are reluctant to respond without knowing the details of her concerns.

6. Safety Concerns with S.279. Toyota is pleased that your bill includes safety as a criteria to be considered in establishing the maximum feasible average fuel economy level. Our concerns with the uniform percentage increase approach contained in both S.279 and S.341 are based on the anti-consumer, anti-competitive effects of this approach which will result in a lack of fuel savings. Toyota's written statement submitted to the Committee for the March 20 hearing generally outlines Toyota's position regarding the safety criteria contained in S.341.

7. Approach in S.341. To the extent that S.341 requires DOT to consider safety and emission standards, size, and performance in establishing future CAFE requirements, Toyota applauds the authors of this bill. However,

as I emphasized in my oral statement at the March 20 hearing, S.341 contains a fundamental flaw identical to that in S.279 -- the uniform percentage increase approach which establishes vastly different standards for different manufacturers. This fundamentally flawed approach will create a number of perverse effects -- not the least of which is that it will not achieve the anticipated fuel savings.

First, different standards for different companies penalize those that have done the most. Never again will any company have an incentive to exceed regulatory standards -- for fuel economy, emissions or safety -- lest that performance become the baseline for discriminatory new government standards.

Second, assuming hypothetically a 20 percent increase, a company achieving 28 mpg in 1996 could be rewarded with credits, while Toyota could be penalized for achieving 36 mpg -- 6/10th's of a mile short of its standard. The logic of this approach escapes us.

Third -- and most important -- the desired fuel economy gains will not be realized. We firmly believe this unintended result will occur for two reasons: 1) the market will shift to less fuel-efficient vehicles; and, 2) the uniform percentage increase approach creates substantial opportunity to "game" the system.

The anti-competitive effects of this approach would assure that fuel-efficient leaders, like Toyota, would be legislated out of certain markets where we currently offer a higher mileage choice for American consumers. Many of the most fuel-efficient vehicles would be replaced with less fuel-efficient vehicles. This effect will frustrate the fuel savings goals of CAFE.

Moreover, as the globalization of our industry has matured, the interrelationships among automakers have materialized and accelerated for a variety of sensible competitive reasons: technology transfer, equity needs and market expansion are just a few. The uniform percentage approach is likely to provide an unexpected reason for entering into these arrangements -- to "game" the system in order to minimize CAFE requirements. Attachment III is a copy of my April 3, 1991, letter to Committee Chairman Johnston which discusses the "gaming," issue in detail.

In contrast to the flawed uniform percentage increase approach, a CAFE program based on EPA size classes or market segments minimizes the "gaming" problems created by that approach, while at the same time forces fuel economy technology across all model lines. Under this approach, the sales-weighted fuel-economy average of all cars in each EPA size class would serve as the basis for future standards. Fuel economy levels for each class could be established either by requiring uniform percentage or mpg increases. A company that exceeded the applicable standard in any class would earn credits that would be transferable to other classes. This feature would add flexibility for manufacturers. The size class approach would alleviate the "gaming" problems previously referred to, as all vehicles would fit neatly into a class with a defined fuel economy standard.

If for some reason, a size-class approach cannot be incorporated into S.341, surely the Committee or DOT can develop an approach that is less flawed than uniform percentage increase.

Once again, I want to thank you for giving Toyota the opportunity to present its views to you and the Energy Committee on this important topic. I pledge that Toyota will work with you, other Committee members and staff to develop a workable CAFE program that assures increases in fuel efficiency while providing consumer choice.

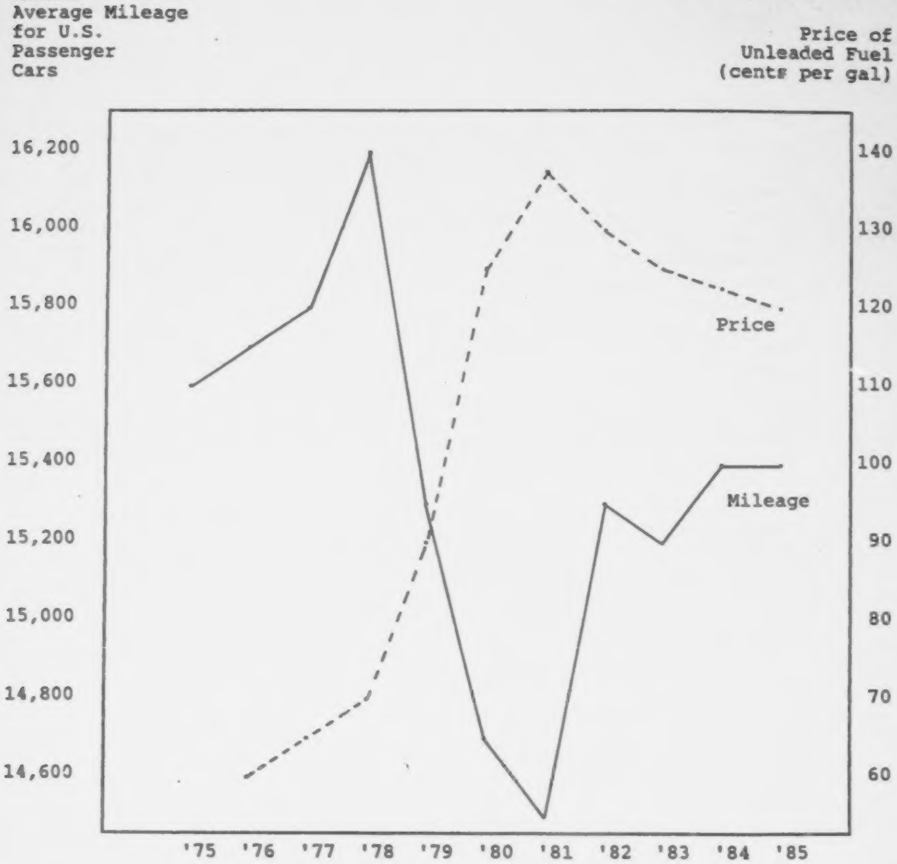
Sincerely,

Jim Olson

James R. Olson
Vice President, External Affairs

Attachments

ATTACHMENT I



Source: Fuel Price DOE; Mileage MVMA Data Book

ATTACHMENT II

THE IMPRACTICALITY OF THE AXV'S FUEL ECONOMY IMPROVEMENT TECHNOLOGY FOR PRODUCTION VEHICLES

TECHNOLOGY	REASONS WHY
Direct Injection Diesel Engine	1. Noncompliance with NOx and particulate emission standard. 2. Noise level above engineering standards. 3. Low market demand for diesel powered vehicles. 4. Engine vibration level above engineering standards.
CVT (Continuously Variable Transmission)	1. Need of improving the belt durability. 2. Low torque sufficient only for small vehicles.
Light-Weight Materials Resin...Body Panels; Windows FRP* . . . Suspension, Steering, Chassis Components Aluminum . . . Engine Block *Fiber Reinforced Plastics	1. Large cost increases. 2. Insufficient long-term durability.
Streamlined Styling	1. Incompatible with space utility and styling design. 2. Difficult to assure cooling performance.

TOYOTA

Toyota Motor Sales, U.S.A., Inc.
1850 M Street, N.W., Suite 600
Washington, D.C. 20036
(202) 775-1700
(202) 822-0928 Fax

April 3, 1991

The Honorable J. Bennett Johnston
Chairman
United States Senate Energy Committee
364 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairman Johnston:

During the Energy Committee's March 20, 1991, CAFE hearing you requested members of the auto industry panel to provide additional comments regarding the problem of "gaming" that is raised by a uniform percentage increase (UPI) approach to CAFE, as was discussed by Toyota and Mr. Duleep. Your questions during the hearing about this issue implied a well-founded concern that establishing different standards for different companies creates inherent incentives for manufacturers to "game" the system and, thereby, frustrate the desired energy conservation goals.

As I testified during the March 20 hearings, "gaming" of the system can take principally two forms: 1) new entrants -- companies entering the U.S. market after the base year -- will compete free of CAFE constraints and at a competitive advantage; and 2) the numerous and growing interrelationships among the world's automakers will enable companies to avoid the disparate effects created by the UPI approach, "rebadging" cars in a way that artificially will raise CAFE, but not fuel savings. We see no effective solution to either problem if the uniform percentage increase approach is enacted.

With respect to new entrants, Toyota testified that under S.341 any company entering the market after the base year would enter free of CAFE restraints. This new entrant "gaming" could be particularly egregious in the light-truck market where companies currently not in the market -- like Honda or Mercedes -- could begin selling pick-ups, vans or sport utility vehicles in the U.S. relatively free of CAFE constraints.

One witness responded to the new entrant question by suggesting that DOT could establish a CAFE standard for the new entrant based on a comparison of vehicles of similar size or weight. This class-based solution is fundamentally the size class approach outlined by Toyota in our written statement. If this method of setting CAFE levels is best for new entrants, why is it not equally appropriate for the entire CAFE program? Under a class-based approach all existing and new entrants to the class would be required to meet an identical standard applicable to that class, utilizing the market to drive technological innovation and fuel savings. No new DOT rulemaking would be necessary for new entrants.

If the Committee insists on retaining the uniform percentage increase approach for existing manufacturers and shifts to a system using a class-based approach for new entrants into the market, this will lead to endless DOT rulemakings and, we expect, protracted litigation. The agency will have to set a CAFE standard for each new entrant. Given the highly competitive nature of the auto industry, each rulemaking is likely to be contentious and litigation over each and every standard is a distinct possibility. No company will want a new entrant to enjoy a competitive advantage over similar models in its fleet. Likewise, the new entrant will want to gain as much of an advantage as possible.

In addition, this proposed solution does not address the situation where a new entrant decides to introduce a second vehicle at some point in the future. Must DOT create a separate standard for each new vehicle, or must it recalculate a new CAFE standard for the company, based on both vehicles? As more vehicles and more entrants come on line, DOT's problems multiply, as do the problems for existing manufacturers.

Establishment of a size class CAFE program would, by definition, avoid the complexity of having a uniform percentage increase approach govern one group of manufacturers and another approach govern another group of manufacturers. Under this scenario, not only would the government create different standards for different companies, but it would do so using different formulas, depending on when a company entered the U.S. market. This cannot be an effective or sound policy.

Senator Bryan's bill, S.279, appears to address new entrants by establishing a "default" standard -- a minimum standard applicable to any manufacturer. While this approach has the virtue of simplicity, it also provides a competitive advantage for new entrants over all other manufacturers that have higher standards. We fail to see how this approach will save fuel. To the contrary, as lower-mileage new entrants replace higher-mileage existing vehicles, the fuel economy of the new car fleet actually would decline.

Moving from the new entrant question to other forms of "gaming," one must start with a recognition that the motor vehicle industry is truly global in nature. As our previous submission to your Committee documented, there are scores of interrelationships among manufacturers worldwide. These have occurred for a variety of reasons: technology transfer, equity needs and market expansion are just a few. To prevent the use of these existing and future relationships, in part for CAFE reduction purposes, would force the U.S. government to intervene deeply in the creation and operation of these business relationships. We find it difficult to comprehend how Congress could -- or would even want to -- try to manage current and future arrangements. Attempting this could abrogate many existing agreements, both in the U.S. and overseas. Companies that need equity, technology, manufacturing capacity or marketing agreements could be severely harmed if joint agreements are somehow limited or prohibited.

For example, we fail to see how the government could regulate the allocation of vehicles among manufacturers, whereby vehicles produced by one company often are marketed by another. This process of rebadging is going on everyday among manufacturers. In certain circumstances today, the same car is being sold under two different labels. We raised this issue at the March 20 hearing using the following example: a company with a low-mileage fleet enters into an arrangement to sell, under its nameplate, a high-mileage vehicle produced by another manufacturer -- even a model already being sold in the U.S. By that simple change in nameplate -- rebadging -- the low-mileage company's CAFE increases, even though precisely the same cars are sold in the U.S. The result: a rise in CAFE performance, but absolutely zero fuel savings.

We're at a loss to see how this situation can be prevented without the government somehow determining the motivation for joint agreements that also may have legitimate commercial purposes. Before any suggestions to address rebadging and joint agreements are incorporated into S.341, we urge the Committee to consider the full consequences of the proposal on the entire range of activities conducted by the motor vehicle industry.

As was the case with new entrants, the issue of "rebadging" is addressed easily under a size class approach. Any rebadged vehicle would be required to meet the CAFE standard applicable to the size class in which it falls. This is a far simpler and much less intrusive approach than potential fixes under the uniform percentage increase approach.

"Gaming" problems cannot be fixed because they are inherent to a system which mandates high standards for some manufacturers and lower standards for others. This system creates an incentive for artificial arrangements among companies for no other purpose than to avoid CAFE requirements.

Mr. Chairman, I also would like to elaborate on another question you posed during the hearing: what if the CAFE standards were so high that there were no more big domestic cars -- no Lincolns, no Cadillacs. Could a company like Mercedes-Benz, with a lower fuel economy standard, produce a more affordable, low-mileage big car, come into the market and fill the void for the large-car buyer left by the domestics? As we responded at the hearing, the answer is absolutely yes. As long as Mercedes meets its lower CAFE target it can sell all the large cars it wants. There is absolutely nothing in S.341 or S.279 which would prevent this from happening. It is our firm judgement that this displacement would occur throughout the new car and truck fleet. As companies with higher standards are forced to eliminate or reduce the sale of fuel-efficient models from various market segments, those vehicles will be replaced with less fuel-efficient vehicles. This effect will frustrate the anticipated fuel savings.

Establishing a CAFE program requiring different standards for different companies based on uniform percentage increases will result in a complicated and ineffective system, which will not provide consumers with the best choice of fuel-efficient vehicles. We urge the Committee to avoid locking DOT into this simplistic and flawed formula for all CAFE determinations.

Finally, I would like to briefly comment on the increases achievable under the "maximum technology" scenario described by Mr. Duleep. As I pointed out during my oral statement, Toyota already employs most of the technologies Mr. Duleep described in the early 2000's Taurus. Under a percentage increase approach, Toyota will not be able to achieve the percentages Mr. Duleep described as "conceivable" for the overall industry using the technologies he outlined. In addition, Toyota believes Mr. Duleep's estimates of the benefits associated with certain technologies may be somewhat optimistic.

Toyota appreciates the opportunity to present its views on S.341. We pledge to work with you and other Committee members to help fashion a responsible CAFE program that insures increased fuel efficiency across all classes of vehicles.

Sincerely,

J. R. Olson

James R. Olson PS
Vice President, External Affairs

J. BENNETT JOHNSTON, LOUISIANA, CHAIRMAN

DALE BUMPERS, ARKANSAS
WENDELL H. FORD, KENTUCKY
BILL BRADLEY, NEW JERSEY
JEFF BINGAMAN, NEW MEXICO
TIMOTHY E. WIRTH, COLORADO
KENT CONRAD, NORTH DAKOTA
DANIEL K. AKAKA, HAWAII
WYCHE FOWLER, JR., GEORGIA
RICHARD C. SHELBY, ALABAMA
PAUL WELLSTONE, MINNESOTA

MALCOLM WALLOP, WYOMING
MARK O. HATFIELD, OREGON
PETE V. DOMENICI, NEW MEXICO
FRANK H. MURKOWSKI, ALASKA
DON NICKLES, OKLAHOMA
CONRAD BURNS, MONTANA
LARRY E. CRAIG, IDAHO
JOHN SEYMOUR, CALIFORNIA
JAKE GARN, UTAH

BENJAMIN S. COOPER, STAFF DIRECTOR
D. MICHAEL HARVEY, CHIEF COUNSEL
G. ROBERT WALLACE, STAFF DIRECTOR FOR THE MINORITY
GARY G. ELLSWORTH, CHIEF COUNSEL FOR THE MINORITY

United States Senate
COMMITTEE ON
ENERGY AND NATURAL RESOURCES
WASHINGTON, DC 20510-6150

March 26, 1991

Mr. John DeCicco
American Council for an Energy Efficient Economy
1001 Connecticut Avenue, N.W.
Suite 535
Washington, D. C. 20036

Dear Mr. DeCicco:

I would like to thank you for presenting your testimony pertaining to the CAFE provisions of Subtitle A of Title XI of S. 341 at the hearing held by the Committee on Energy and Natural Resources on March 20, 1991. Your time and effort to provide the Committee with your views pertaining to Corporate Average Fuel Economy are greatly appreciated.

In order to assist the Committee in its consideration of this pending legislation, I am attaching additional questions from our Members for inclusion in the hearing record. I would appreciate your sending your responses to Karl Hausker of the committee staf by close of business on April 12, 1991.

Again, thank you for your testimony. I look forward to receiving your additional comments.

Sincerely,

Bennett Johnston

J. Bennett Johnston
Chairman

JBJ/kah

Questions for Mr. John DeCicco, American Council for an Energy Efficient
Senator Malcolm Wallop (R-WY) Economy
CAFE provisions of S. 341
March 20, 1991 (9:30 a.m.)

QUESTIONS FOR AUTO INDUSTRY PANEL

1. The current CAFE debate centers on defining the maximum feasible average fuel economy for automobiles and light duty trucks. When determining technical feasibility,

   a. What consideration is given to economic feasibility from the standpoint of the consumer? For example, what is the relationship between economic feasibility as that term is used and cost-effectiveness from the standpoint of the new car purchaser?

   b. What consideration is given to the financial capability of a given manufacturer to incorporate a technically achievable technology within its total new car product line?

   c. In other words, when determining feasibility from the standpoint of the manufacturer, what consideration is given to the time between when a manufacturer is able to introduce a new technology on one vehicle in its product line and when the given manufacturer can apply that technology to its total product line?

2. What is the added cost if any of the various technological improvements such as variable valve control, fuel injection, etc., to the consumer in terms of frequency and cost of repairs?

3. What effect has existing CAFE standards in the United States had on per capita fuel consumption? And on vehicle miles driven?

4. There are press reports of experimental cars capable of achieving over 50 miles per gallon. Why are the constraints on making such cars available to consumers?

5. In earlier testimony, Dr. Whitman stated that "Other aspects of the CAFE program have reduced and will continue to reduce fuel savings potential even further.". Will you please give some specific examples for the record?

6. What specific safety concerns do you have with the approach taken by Senator Bryan in S. 279?

7. Do you generally support the approach of S. 341? What specific recommendations do you make for improvements? Do you have a suggestion for an alternative approach?

ACE3
American Council for an
Energy-Efficient Economy

1001 CONNECTICUT AVE., N.W. SUITE 535 WASHINGTON, DC 20036 (202) 429-8873

12 April 1991

J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, DC 20510-6150

Re: Response to follow-up questions on our testimony of 20 March 1991.

Dear Senator Johnston:

In reply to questions raised during the March 20 hearing on the CAFE provisions of S. 341 and the written questions provided with your letter of March 26, I have prepared the attached responses for inclusion in the hearing record.

You are most welcome in your requests to ACEEE for comments on energy legislation and if we can be of further assistance, do not hesitate to contact me.

Sincerely,

John M. DeCicco, Ph.D.
Research Associate

RESPONSES FOR THE RECORD OF THE HEARING OF 20 MARCH 1991 ON THE CORPORATE AVERAGE FUEL ECONOMY (CAFE) PROVISIONS OF THE NATIONAL ENERGY SECURITY ACT OF 1991 (S. 341)

Prepared for the United States Senate
Committee on Energy and Natural Resources

by John DeCicco and Howard Geller
American Council for an Energy-Efficient Economy
12 April 1991

Regarding differences between ACEEE and OTA analyses of feasible CAFE targets

The basic reason why ACEEE and OTA differ on the maximum feasible level for CAFE standards is that we use differing assumptions about the fuel savings from the technologies considered. We also include additional technologies which we judge will be cost-effective by 2001. To clarify this issue, I have summarized the key savings potential estimates being used to justify CAFE targets. Table 1 lists the estimated fuel economy increases for the set of technologies considered, drawing on information from references [1] to [5]. This table shows that there is a continuum of answers, reflecting assumptions and judgements about the applicable technologies and the uncertainties inherent in making such projections.

In developing our estimates [1], ACEEE worked from the same set of information as [2] - [4], based on the Technology/Cost Segment Model (TCSM) developed for the Department of Energy by EEA (Energy and Environmental Analysis, Arlington, VA). ACEEE also undertook an independent review of the published literature on fuel economy technologies. We find that the recent OTA results are based on very conservative estimates of the fuel savings potential by technology and by degree of applicability. We use mid-range estimates, neither very conservative nor very ambitious. Indeed, subsequent analyses by An and Ross [5] focussing on engine mechanical efficiency and drive train improvements demonstrate that an even greater potential exists in these areas than previously reported. The results of this analysis are listed as composite estimated improvements, accounting for the interactions between specific technologies. It shows potential fuel economy improvements of 34% from engine mechanical efficiency improvements and another 20% from transmission optimizations. Although An and Ross did not examine load reduction measures, so these remain unchanged, it should be noted that ongoing developments in aerodynamics--a number of prototypes with a drag coefficient (C_D) well below 0.3, including the GM Impact with C_D of 0.19---make the previous savings potentials in this area appear quite modest.

The technology penetrations used in all of these estimates (including our own 44 mpg in 2001 estimate) are based on conservative cost-benefit analyses. The discount rates used are 7% - 10% real, rather than the 3% real discount rate which is more appropriate for judging economic merit from a national perspective. The discount rate selected for the cost-benefit analysis determines how many efficiency measures come into play. For example, weight reduction through materials substitution and packaging efficiency in design can provide a fuel economy gain of over 6%. This measure is not quite cost-effective at a 7% discount rate, but is cost-effective at a 3% discount rate. Using the 3% discount rate (for societal benefit), weight reduction could raise the new fleet average fuel economy from 44 mpg to 46 mpg at a cost of $1.27/gallon saved ($1989 in year 2001).

Policy makers are best served by being presented with mid-range values and information about the uncertainties and assumptions involved. Then, balancing the interests on either side, they are able to make an informed judgement about the appropriate degree of progressivism or conservatism to use in setting standards. The most recent analyses by Mr. Plotkin appear to impose a very high level of conservatism from the onset, particularly in what he has characterized as the "maximum feasible level." This is evidenced by comparison with earlier assessments, such as the 1988 assessment [6] which, working from a 1987 base, found a "free market" level of 33 mpg possible in *1995* (not 2001!) and an "accelerated technology" level of 39 mpg in 1995. The later would be cost-effective for the nation using conservative cost-benefit accounting but would require a heavy investment in new technologies by the industry.

What has happened to change to possibility of such goals? Certainly technology has not regressed--it has in fact, progressed, as evidenced by the demonstration of new prototypes having very high fuel economies. One thing which has happened is that, in the absence of new regulation, the engineering and marketing skills of the industry have turned sharply away from the provision of fuel economy in order to emphasize other features (luxury, top speed performance, etc.) This probably precludes a 39 mpg goal for 1995, but not a 33 mpg goal, which is right on track with the 20% improvement by 1996 target of S. 279. As a regulatory target, such a level is easily achievable when considering the buffers of the flexible fuel and carry forward credits. As stated in my March 20 testimony, given the additional lead time afforded by the ten years between now and 2001, a maximum technology regulatory target averaging 48 mpg is cost-effective from a national perspective and considering the credits available. Such a goal does not even include the possibility of technical advances very likely to come to fruition if an engineering push is made: this includes items now in the demonstration phase, such as turbocharged direct-injection diesels, advanced two-stokes, advanced aerodynamics, and electric (including hydrid) drive train technologies.

In response to written questions of Senator Malcolm Wallop

1. Regarding feasibility and cost-effectiveness

a. The basis for considering the economic feasibility of fuel economy improvements is a cost-benefit analysis that weighs the fuel savings benefits against the costs of the technology needed to achieve the savings. The fuel cost savings accrue over the lifetime of the vehicle, so cost effectiveness is measured by comparing the annualized cost of improvement against the annual fuel savings. The resulting index is termed the Cost of Conserved Fuel (CCF), expressed in $/gallon. If the CCF for a fuel-saving technology is less than the cost of gasoline, then that technology is cost-effective.

Since the average new car purchaser may not keep the vehicle for its lifetime, the full benefit of the lifetime fuel savings does not apply to him. However, the added purchase cost of fuel economy improvements contributes to the resale value of the vehicle, so some of that cost is passed on to subsequent purchasers of the vehicle. Moreover, cars and light trucks are driven many more miles per year when they are newer than when they are older; this has the effect of front-loading some of the fuel savings, to the benefit of the original owners. For any given purchaser, of course, the cost-effectiveness depends on how much they drive, how long they own the vehicle, and how much they pay for fuel economy features. Since over its lifetime, a vehicle is always owned by some consumer, be they a new car buyer or a used car buyer, the most equitable perspective on cost-effectiveness to the nation as a whole is the overall average lifecycle cost. This is reflected by the CCF mentioned above and is the measure used by ACEEE in evaluating technologies for fuel economy.

b. The technology cost estimates used as the basis of our cost-benefit analysis represent the best available estimates of the retail prices of the technologies considered. As such, they allow for full cost recovery plus a profit margin for the manufacturers.

c. The times required for a technology to be applicably incorporated in a product line are accounted for by the penetration rate targets used in the analysis. The penetration rates are based on historical experience with introducing and incorporating automotive technologies, and so the level of mpg improvement so based are fully feasible in the time frame proposed.

2. There is no additional cost of maintenance above the expected customary maintenance needs now typical in vehicles.

3. Regarding the effect of CAFE on *per capita* fuel consumption and vehicle miles of travel (VMT), I have prepared a graph, attached here as Figure 1. This shows driving age population (age 16 and over) and automobile VMT plotted using the graph's left scale. Automobile gasoline consumption *per capita* is plotted along the right scale in gallons per person per year. Except for the oil shocks of 1973 and 1979 and their subsequent recessions, VMT has grown at a steady rate, linked to but faster than population growth. Gasoline consumption *per capita* had also been growing as fast until 1973, when it dropped in response to this first oil crisis. This first drop was temporary, however. Beginning in 1978--the first year of CAFE standards and prior to the onset of the 1979 crisis--there began a precipitous and sustained drop in *per capita* gasoline consumption. This fall in gasoline consumption continued until 1986, the first year of the CAFE standards rollback and the still continuing trend of putting the new technologies into power performance rather than fuel economy.

Regarding the impact of CAFE-induced fuel economy on VMT, no strong effect is apparent. The most significant determinants of VMT are driving age population, land use development patterns (such as urban/suburban sprawl) that predicate increasing automobile use, and overall economic growth (the rate of VMT growth generally declines in economic downturns, other things being equal, as it did in 1990 even before the onset of the Gulf war). The marginal cost of driving (gasoline price divided by mpg) does, of course, have some effect, which historical data suggest is on the order of 10% (magnitude of the elasticity of travel with respect to cost/mile [7]). The data also suggest a declining trend in the elasticity, since as fuel economy goes up while fuel prices remain stable, the fuel cost becomes an ever smaller portion of the total cost of operating a vehicle. For present levels of fuel economy and the higher levels that would come with increased CAFE standards, an effect on the order of 5% is more applicable. This would mean that, other things equal, a 40% increase in CAFE might induce a 2% increase in VMT.

4. High-mileage vehicles that offer the continuing advances in technology for efficiency are not likely to be widely available to consumers unless there is tough new CAFE regulation to require manufacturers to bring such vehicles into production and marketing. This is why we need a significant increase in CAFE if we wish to achieve meaningful oil savings over the next ten years.

5. Best addressed by Dr. Whitman of General Motors.

6. As discussed in our written testimony, ACEEE has no safety concerns about the CAFE legislation proposed in S. 279. We believe that the safety arguments being raised by the Bush administration and some elements of industry are misleading and even hypocritical given their ongoing resistance to requiring and installing known safety measures.

7. We are not supportive of the specific approaches to CAFE taken in S. 341, for reasons discussed in our testimony. A focussed CAFE bill with specific mandated targets would be a much more effective approach. Examples are the moderate increase specified in S. 279 and the more ambitious but still feasible and cost-effective 60% increase exemplified by H.R. 446.

References

[1] Ledbetter, M., and M. Ross (L&R). Supply curves of conserved energy for automobiles. American Council for an Energy-Efficient Economy, Washington, DC, March 1990.

[2] Difiglio, C., K.G. Duleep, and D.L. Greene (DD&G). Cost effectiveness of future fuel economy improvements. Energy Journal, January 1989.

[3] Office of Technology Assessment (OTA). Increasing the efficiency of automobiles and light trucks--a component of a strategy to combat global warming and growing U.S. oil dependence. Statement of Steven Plotkin before the Consumer Subcommittee, Commerce Committee, U.S. Senate, Washington, DC, May 2, 1989.

[4] Office of Technology Assessment (OTA). Estimating feasible level of Corporate Average Fuel Economy. Statement of Steven Plotkin before the Committee on Energy and Natural Resources, U.S. Senate, Washington, DC, March 20, 1991.

[5] Personal communication, M. Ross to J. DeCicco, ACEEE, based on recent analyses of advanced fuel economy technology by F. An and M. Ross at University of Michigan, March 1991.

[6] EEA. Energy and Environmental Analysis, Inc. Developments in the fuel economy of light duty vehicles. Revised draft prepared for the Office of Technology Assessment, U.S. Congress, Washington, DC, August 1988.

[7] Greene, D.L. Vehicle use and fuel economy: How big is the "rebound" effect? Draft paper, Center for Transportation Analysis, Oak Ridge National Laboratory, February 13, 1991.

Table 1. A comparison of automobile fuel economy assessments

Given as percent increases for an individual vehicle

	TYPE	TECHNOLOGIES	L&R Mar90	DD&G Jan89	OTA May89	OTA Mar91	A&R Mar91
1	Engine	4 valves / cylinder	6.8%	10.0%	7.5%	7.0%	
2	Engine	Intake valve control	6.0%	8.0%	4.0%	6.0%	
3	Engine	Multi-point fuel inject	3.5%	3.0%	3.0%	3.0%	
4	Engine	Friction reduction	4.0%	2.0%	1.5%	2.0%	
5	Engine	Roller cam followers	1.5%	1.5%	1.5%		
6	Engine	Overhead cam	6.0%	6.0%	6.0%	3.0%	
	ENGINE TOTAL		27.8%	30.5%	23.5%	21.0%	34.0%
7	Transm	Torque conv. lockup	3.0%				
8	Transm	Add gear (OD) automatic	4.7%	7.5%	7.5%	2.5%	
9	Transm	Transmission mgmt	8.0%	1.5%	1.5%		
10	Transm	Continuous vary trans	4.7%		7.5%	2.5%	
	TRANSMISSION TOTAL (ex CVT)		15.7%	9.0%	9.0%	2.5%	20.0%
11	Load	Advanced tires	0.5%				
12	Load	Weight reduction	6.6%	6.6%		6.6%	
13	Load	Lube & tire improvements	1.0%	1.0%	1.0%	0.5%	
14	Load	Accessory improvements	1.7%	1.0%	1.0%	1.0%	
15	Load	Aerodynamics	4.6%	3.4%	3.4%	2.3%	
	LOAD REDUCTION TOTAL		14.4%	12.0%	5.4%	10.4%	
16	Other	Front wheel drive	10.0%	12.0%	12.0%	10.0%	
17	Other	Idle off	9.0%				7.5%
	OTHER TOTAL		19.0%	12.0%	12.0%	10.0%	
GRAND TOTAL, uncorrected			101%	78%	59%	51%	
Year 2000 cost-effective penetration (relative to 1987 base, 28.3 mpg)			55%	*	*	30%	

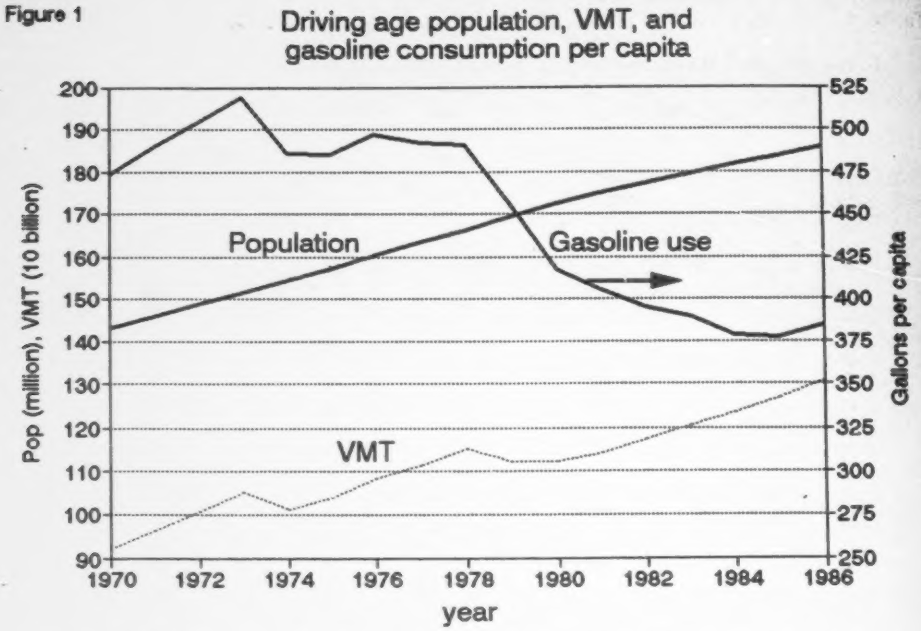
REFERENCES (see text): L&R [1], DD&G [2], OTA [3,4], A&R [5].

NOTES BY ITEM:

1 OTA89,90 given here as average of several config. dependent values
3 OTA89 given here same as OTA91 value
8 DD&G go 3-4; R&L go 3/4-5, and OTA91 goes 4-5 gears
9 R&L use advanced fuel-economy optimized trans. mgmt.
10 CVT treated as mutually exclusive with other transmission measures, if applied, there would be some added gain by trans mgmt optimization.
15 R&L go to Cd 0.30; DD&G go to Cd 0.32

* Not reported for year 2000; the assessments were for 1995, for which DD&G found 34% (max feasible) and OTA89 found 17% (cost-eff, attainable)

Figure 1



Source: ACEEE, using data from Stat.Abs. of U.S. and ORNL Transp. Energy Data Book

Appendix III—Additional Material Submitted for the Record

Statement of Honda of North America, Inc. on
S. 341, National Energy Security Act
Submitted to the Senate Energy and Natural Resources Committee
February 28, 1991

Honda North America respectfully submits the following comments for the record on Title XI, Subtitle A of S. 341 currently under consideration by the Senate Energy and Natural Resources Committee. We request that this statement be a part of the February 28 hearing record.

Honda believes CAFE should be considered in the context of an overall national energy strategy and wants to commend Chairman Bennett Johnston and Ranking Republican Malcolm Wallop for their efforts in this regard. We do not oppose an increase in CAFE. Honda supports the general direction of the CAFE provisions of S. 341 which provides the Department of Transportation (DOT) with authority to set the standards based on a series of economic and technological criteria.

The National Academy of Sciences (NAS) has already begun a detailed and unbiased analysis of the potential future fuel efficiency gains which can be achieved. NHTSA Administrator Curry committed to support the NAS results at the February 21, 1991 hearing of the Commerce Committee's Consumer Subcommittee on S. 279. He has stated several times that he believes further improvements in fuel economy are doable and that higher targets should be set. We believe the study currently being conducted by the NAS should form the basis for future fuel economy standards.

Honda strongly objects to the provision in S. 341 that mandates a percentage increase in each manufacturer's 1990 CAFE. We believe DOT should be given the authority to determine both the approach and the stringency of any new CAFE program. The percentage increase approach penalizes manufacturers who have already used many of the existing technologies to achieve higher fuel economy. These fuel economy leaders start at a higher 1990 base and have to reach a much higher standard than companies with lower fuel economy. This places their products at a competitive disadvantage and restricts competition in certain market segments. It may eliminate certain types of vehicles from the high fuel economy fleets while allowing similar but less fuel efficient vehicles to be sold by manufacturers with lower standards. Limited competition guarantees higher vehicle prices and will undermine achievement of environmental goals.

The percentage increase approach would be a dramatic departure from the way in which the motor vehicle industry has been regulated to date. Manufacturers meet the same standards for emissions, safety and fuel economy.

While we prefer a single number CAFE standard, we recognize that it is insensitive to model mix and consumer demand. If a single number is unacceptable, we believe DOT should consider some type of market segment approach which allows manufacturers to compete head to head in specific market segments, not on an aggregated fleet basis. Through the use of penalties, credits and minimum standards, energy conservation goals can be met without limiting competition and consumer choice. Honda also believes that in order to significantly shift consumer demand to more fuel efficient vehicles, it may be necessary to consider market incentives such a fuel taxes, purchase incentives and tax credits. We support scrappage programs, like that contained in Section 514 of S. 341.

Honda has identified increased fuel efficiency as a high priority and is committing significant resources for further fuel economy improvements. We are continuing work on reduced rolling resistance, improved aerodynamics, weight reduction through better structural design, more extensive use of lightweight materials, and additional refinements to the engine and drivetrain. However, many of these efforts are still in the developmental stage and will not be ready for commercial application for some time. Honda already uses many of the existing technologies to improve fuel economy and therefore further improvements will be limited in the near term (see attached chart).

We currently produce the Civic CRX HF, the highest rated 4 cylinder vehicle available today. It accounts for less than 1% of our 1991 projected sales as it is very small, equipped with a manual transmission and does not meet the needs of a majority of consumers. Our Civic line, whose fuel economy ranges from 28/32 mpg (city) to 33/37 mpg (highway), will get a full model change in MY 1992 and its fuel economy will improve. A new vehicle, a Civic VX, will replace the CRX HF. It has fuel economy targets of 65 mpg (highway) and 50 mpg (city) unadjusted. However, based on past sales of the CRX HF, we expect to sell a limited amount of these cars.

Performance is an area which the consumer has identified as a factor in their purchasing decision. While downgrading performance to a limited extent in order to achieve additional improvements in fuel economy cannot be precluded, it must be considered in the context of what the consumer is demanding. Honda believes it has struck the proper balance between performance, fuel economy and a number of other factors to meet consumer needs. A good example is the Honda Accord which has been the number 1 selling car in the U.S. the past two years. Last year 2/3 of the Accords sold in the U.S. were made in Ohio.

Fuel economy is but one feature that the consumer considers when purchasing a vehicle. Other features such as size, safety, styling, and comfort and convenience are more important to many consumers. For the manufacturer, new emissions and safety requirements and price must also be factored into the equation. Emission requirements under the new clean air law provide tremendous challenges for the vehicle manufacturer, particularly in the later years with Tier II tailpipe standards and separate requirements in California, New York, and Massachusetts. It is critical that these factors be carefully evaluated in terms of their impact on fuel economy and the manufacturers' ability to meet significantly higher standards over the next ten years. Because the consequences of these requirements are still largely unknown, DOT discretion to modify the standards should be granted in case conflicts arise in these areas.

Safety is a combination of many things including consumer preferences and perception as well as the basic laws of physics. New safety standards will impact the effort to improve fuel economy. They pose a greater challenge for smaller cars since they increase weight. Despite this, Honda has announced that it will install both driver and passenger air bags in all U.S. models by MY 1994. We note that S. 341 contains an air bag credit for small cars. We suggest that this credit be extended to all air bag equipped vehicles. Safety is not just a matter of vehicle size.

The cost-effectiveness of any future CAFE standard will depend upon the extent to which a manufacturer has already made the investment to use existing fuel economy technologies in their fleet. Not only will manufacturers like Honda be forced out of some markets, which will increase the price of vehicles in those market segments, but the cost of all our vehicles will increase disproportionately under a percentage increase approach.
This point was made by the Department of Justice in their January 26, 1990 letter to Senator Richard Bryan opposing the percentage increase approach of S. 1224, the earlier version of S. 279. In that letter they say:

> "By setting standards through a percentage increase over each firm's 1988 level, S. 1224 could require high-fuel-

> economy firms to develop very difficult and expensive technologies while allowing firms with lower average fuel economies to avoid the expense of applying even basic technologies that other manufacturers may have used for years. Thus, the methodology of S. 1224 discourages relatively inexpensive ways to improve fuel efficiency, requires relatively expensive measures to be taken, and raises the costs of attaining any particular national fuel economy level. Moreover, this approach discourages widespread adoption of those innovations that are developed to further improve the fuel economy of the firms that currently are the most fuel efficient."

Credit trading is good economic policy since it will achieve the required improvements at lower cost to society than otherwise. However, the entire issue of credit trading is reliant upon the CAFE standard being set at a level which allows manufacturers to earn credits. We concur that credits earned under the new program should be able to be retained until used. Further, we support extension of credits earned prior to 1996 for 3 years as is now permissible under the existing CAFE scheme. However, we caution that the ability of manufacturers to buy and sell credits may be somewhat limited in actual practice.

The existing distinction between import and domestic fleets is not relevant today and only serves to create barriers to increased domestic sourcing. Both of Honda's U.S.-produced models are nearing the 75 percent domestic content level. Shifting vehicles between fleets for CAFE purposes may help a manufacturer be in compliance, but it does nothing to reduce the consumption of gasoline. Removal of the distinction between the fleets would provide manufacturers with greater flexibility and we expect it would result in increased U.S. employment.

Honda supports the change proposed in S. 341 that removes the unlawful conduct provision but we believe that compliance with fuel economy regulations must be the goal of all manufacturers. We support the provisions of this bill that provide manufacturers with increased flexibility. We believe the financial penalty for non-compliance should be an incentive for manufacturers to improve their fuel economy.

In conclusion, Honda believes CAFE is an appropriate part of an overall national energy strategy and should be based on a format which promotes competition among all manufacturers. We oppose legislatively mandating a percentage improvement from different baselines. We support giving DOT the authority to evaluate what is technologically and economically feasible. The results of the NAS study are key ingredients to this overall analysis and decision-making process. Any program to encourage energy conservation should include market incentives to spur consumers to buy more fuel efficient vehicles.

Honda is committed to improving vehicle fuel economy and looks forward to working with the Committee and its staff as you consider this issue further.

Honda Penetration of Selected Fuel Efficiency Technologies

Technology	MY 1984	MY 1986	MY 1988	MY 1991 (Projected Sales)
Front Wheel Drive	100%	100%	100%	99.7%
4 Cylinder - 4 Valve	0%	12.9%	21.8%	91.5%*
Overhead Camshaft	100%	100%	100%	100%
Low Friction Piston Rings	100%	100%	100%	100%
Fuel Injection:	0%	35.6%	65.4%	100%
Throttle Body	0%	0%	22.5%	23.5%
Multipoint	0%	35.6%	42.9%	76.5%
Intake Valve Control	0%	0%	0%	0.30%
4-Speed Automatic Transmission	78.4%	100%	100%	100%
Electronic Transmission Control	0%	0%	19.7%	70%
Fuel Efficient Lubricants (5W-30)	0%	0%	100%	99.7%

*The other engine is 3-valve.

Volkswagen of America, Inc.

SUBMISSION FOR THE RECORD

Concerning

S. 341

National Energy Security Act of 1991

Hearings Before the U.S. Senate
Energy and Natural Resources Committee

February 28, 1991

Volkswagen of America, Inc. (VWoA), the authorized importer of Volkswagen and Audi automobiles, with headquarters in Troy, Michigan, respectfully submits the following comment for the record on S. 341, the National Energy Security Act of 1991. We request that this statement be included in the hearing record on S. 341.

SUMMARY

VWoA commends Senators Johnston and Wallop for introducing automobile fuel economy legislation that takes into account several factors that have been sorely missing from certain other CAFE bills under consideration. Specifically, these factors: (a) include a Department of Transportation evaluation of the maximum feasible fuel economy increases based on economic practicability; and (b) recognize the importance of maintaining vehicle size and performance levels compatible with the desires of the car-buying public.

(1) There is one particular component of the CAFE program proposed in S. 341 that we cannot support, and that is the "percent increase" concept which would set different standards for different manufacturers. This concept would disadvantage VWoA, a multi-line car company, in the marketplace.

(2) Volkswagen and Audi vehicles already incorporate all of

the technology cited by the Office of Technology Assessment (OTA) to improve fuel economy. Therefore, there is little opportunity to raise the VWoA CAFE level with these measures. The degree to which different manufacturers have applied fuel-saving technology needs to be accounted for in the difficult quest for equitable CAFE standards.

(3) The role of consumer demand in the marketplace is of enormous importance, as recognized by the criteria factors in S. 341 noted above. The VWoA experience in the early 1980s is a classic example of this role. When fuel prices and availability were out of line in this period, the VWoA CAFE rose more than six mpg, only to drop the same amount when fuel prices returned to normal.

(4) VWoA supports the removal of the CAFE credit cap associated with the sale of dual-fuel vehicles. Repealing this cap would encourage increased sales of Volkswagen models capable of operating on methanol, with an expected attendant increase in the availability of methanol-based fuel.

(5) Consideration of changes in the CAFE law should not overlook the possible impact of a United States-Mexico Free Trade Agreement on the definition of "domestic" and "import" categories of manufacturers. We recommend that the proposed United States-Mexico Free Trade Agreement have a neutral impact on a

manufacturer's competitive position vis-a-vis CAFE. This could be accomplished by giving a manufacturer the choice of determining whether Mexican-produced vehicles were to be included in its "domestic" or "import" fleet for CAFE purposes.

1. The "Percent Increase" Concept To Set Different Standards for Different Manufacturers Is Not Equitable.

The concept of manufacturer-specific "percent increase" fuel economy standards is a punitive measure that would disadvantage VWoA in the marketplace.

Even if the percent increases derived from a DOT-sponsored analysis were to be extremely modest, and even if the base model year chosen were to bring the majority of manufacturers close to the same starting point, the "percent increase" concept is inherently flawed. With such a concept imbedded in a new CAFE law, there is great risk that high percent increase levels or widely varying base model year CAFEs adopted at some future time would result in market manipulation, with disadvantages to those forced to meet higher standards.

The U.S. domestic car manufacturers have made significant gains in improving their CAFE levels over the past fifteen years. To now adopt a concept that would place a more demanding standard on VWoA than on other manufacturers is out of place in the U.S.

legislative process. This discrimination would be especially unwarranted for Volkswagen, a name synonymous with fuel-conscious cars for American buyers since the 1950s.

Recently, some alternative CAFE concepts have been proposed which would be based on size classes or market segmentation. VWoA's initial analysis of these alternatives shows that they could reduce the flexibility in market mix offerings by a manufacturer, compared to the existing CAFE law which sets a single standard for all manufacturers. Perhaps these alternatives can be developed sufficiently to overcome this reduced flexibility, but until such time as this occurs VWoA remains highly skeptical of these approaches.

2. The Technology To Achieve Significant CAFE Increases Is Not Available For VWoA's Products.

Much of the debate surrounding legislation to increase manufacturers' CAFE centers on whether or not technology is available to make additional significant fuel economy gains. The debate is narrowed even further by proponents who maintain that significant gains can still be made without further size and weight reduction (downsizing).

The basic menu of technological measures purported to be available to manufacturers for fuel economy gains was developed by the Office of Technology Assessment (OTA) in 1988 and has been refined over the years. Few would dispute that adoption of technology measures listed by OTA would result in fuel economy improvement.

For Volkswagen and Audi, the technology measures on the OTA menu are not available inasmuch as they have already been adopted, some features as long ago as 1969. Consequently, a significant fuel economy gain based on applying the OTA technology list is out of the question for Volkswagen and Audi models. Let us review these technology measures and their application to the VWoA passenger car product line:

Front Wheel Drive -

Front wheel drive is the technology cited by OTA that gives the highest single fuel economy gain (10 percent), yet that option is not available because all Volkswagen and Audi models already have front wheel drive, and have had since 1981. Many Volkswagen and Audi models incorporated front wheel drive long before 1981, going back to 1969 when Audi cars were introduced into the U.S.

Reduced Aerodynamic Drag -

All Volkswagen and Audi models have Cds at or below 0.36, except for two older models. Volkswagen's newest model, the Passat, has a Cd of 0.31, among the lowest of any production car. Volkswagen AG was one of the first manufacturers to have its own full-scale wind tunnel, in operation before the first energy crisis in 1975, which is used as an integral part of the design process to minimize aerodynamic drag.

Four-speed Automatic Transmission/Lock-up Torque Converters -

Fifty percent of the Volkswagen and Audi models with automatic transmissions are of the four-speed type with lock-up torque converter feature.

Five-speed Manual Transmissions -

All Volkswagen and Audi models with manual transmissions are of the five-speed type, except for one entry level model. Five-speed manual transmissions have been available within the VWoA product line since 1980.

Overhead Cam Valve Operation -

All Volkswagen and Audi models have, and have had since 1981, engines with overhead cam valve operation. The VW Rabbit, and its successor, the VW Golf, have had overhead cam engines since 1975.

Multi-point Fuel Injection -

All Volkswagen and Audi models have, and have had since the late 1970s, engines with multi-point fuel injection. VWoA was the first company to offer multi-point fuel injection in widespread production, beginning in 1968.

Four-valve Cylinder Engines -

Four-valve per cylinder engines are principally high-rpm power enhancers, rather than fuel economy improvers, and are offered in the higher-performance Volkswagen and Audi models. The theory that a two-valve per cylinder engine of certain displacement can be replaced by a four-valve per cylinder engine of lesser displacement is in itself misleading; low-rpm torque characteristics are more important for comparing the fuel economy of engines rather than maximum horsepower characteristics.

3. The Role Of Consumer Demand For Fuel Efficient Cars Is A Key Element.

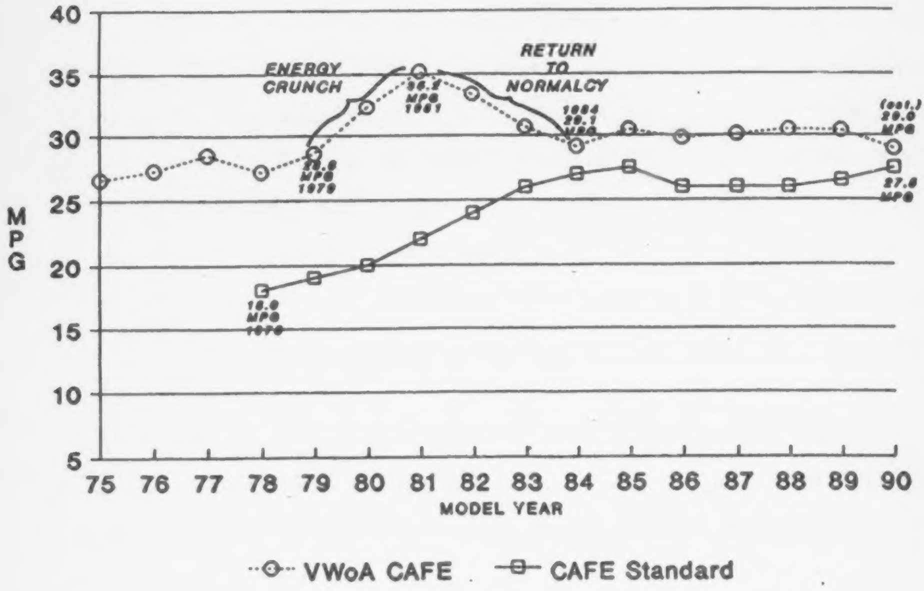
It has been VWoA's experience in the U.S. market that when there is consumer demand for more fuel efficient vehicles, our CAFE has increased remarkedly. Our experience also shows that the opposite is true as well.

Figure 1 is a plot of VWoA's CAFE over the years since 1975. The CAFE standards are also plotted for reference. This figure clearly shows the effect that consumer demand for high mileage cars -- caused by the energy crunch in 1979-1981 -- had on the VWoA CAFE level. From 28.6 mpg in 1979, the VWoA CAFE jumped to 35.2 mpg in 1981. The figure also clearly shows the drop in CAFE, to 29.1 mpg in 1984, when consumer demand for fuel efficient cars waned after the energy crunch. This is clear evidence that market demands affect CAFE levels. If CAFE is to be dramatically increased, the way to do this is through fuel pricing, for example, rather than legislative mandate.

It is important to note that in VWoA's case, CAFE increased during the energy crunch because consumers were willing to trade off performance and comfort attributes for higher fuel economy. During this period, for example, buyers snapped up Volkswagen diesel cars to achieve high mileage at the expense of acceleration performance and comfort level.

Legislation that attempts to reduce vehicular fuel consumption and increase manufacturers' CAFE levels should recognize the importance of bringing market forces into play to achieve the desired results. VWoA supports the attempt to incorporate consumer demand into CAFE legislation as evidenced in S. 341.

VWoA CAFE 1975-1990 Figure 1.



4. The CAFE Credit Cap That Would Restrict The Sale Of Dual-Fuel Vehicles Should Be Removed.

The CAFE credit cap affecting the sale of dual-fuel vehicles in Section 513(g) of the Motor Vehicle and Cost Savings Act should be removed, or at least increased. Volkswagen is a major participant in programs to encourage the acceptance of alternative-fueled vehicles. The Volkswagen Jetta Multi-Fuel model has been introduced in California and New York as part of special local programs to build up methanol-fueled evaluation fleets.

VWoA believes that removing the CAFE credit cap would encourage increased sales of VW models capable of operating on methanol. The availability of more of these vehicles from major manufacturers would be a positive influence on increased access to methanol-based fuels.

5. A United States-Mexico Free Trade Agreement Should Not Adversely Affect A Manufacturer's CAFE Category.

The current CAFE statute establishes and defines two categories for passenger automobiles, relating to whether an automobile is domestically manufactured or imported (15 U.S.C.

2003 [b]). This provision of the statute also stipulates that automobiles manufactured in Canada effectively be treated the same as those manufactured in the U.S. for the category of domestically-manufactured automobiles.

One of the issues that could arise in any negotiations on a U.S.-Mexico Free Trade Agreement (FTA) is the CAFE treatment of automobiles produced in Mexico and imported to the U.S. Several possible scenarios can be envisioned for this treatment, bearing in mind the precedent already set by the CAFE law provision affecting certain automobiles produced in Canada, coupled with the initiative to expand any U.S.-Mexico FTA to include Canada.

VWoA believes that any U.S.-Mexico FTA provisions affecting a manufacturer's CAFE category status should be crafted so as not to competitively disadvantage that manufacturer's current position in the marketplace. In other words, any U.S.-Mexico FTA should be neutral in its influence on the CAFE statute. This could be accomplished by giving a manufacturer the choice of determining whether Mexican-produced vehicles were to be included in its "domestic" or "import" fleet for CAFE purposes.

Conclusion

VWoA appreciates the opportunity to offer comments on S. 341. Thank you for considering our views.

PORSCHE
PORSCHE CARS NORTH AMERICA, INC.

March 13, 1991

The Honorable W. Bennett Johnston
Chairman, The Senate Committee on
Energy & Natural Resources
United States Senate
Hart Building
Washington, D.C. 20510

RE: Title 11, National Energy
Security Act of 1991

Dear Chairman Johnston:

On February 28, 1991, a wide variety of the automobile industry submitted comments to the Corporate Average Fuel Economy ("CAFE") proposal contained in Title 11(A) of your National Energy Bill S.B. 341. After further study of your proposed bill, we would like to offer the following additional comments:

Porsche agrees with the need for all manufacturers to improve the fuel economy of their vehicles. We believe any CAFE program:

1. should be fair and equitable to all manufacturers;
2. should require increases in fuel economy across all model lines;
3. should maintain consumer choice;
4. should be technologically feasible; and
5. should promote safety.

The current CAFE program does not meet the general principles set forth above.

The current program penalizes limited line manufacturers and places them at a substantial competitive disadvantage, because limited line manufacturers cannot average fuel economy achievements from smaller, more fuel efficient vehicles to the larger vehicles. This is borne out by the following startling facts:

1. Only eight manufacturers have ever paid or currently pay CAFE penalties. All those manufacturers are limited line manufacturers.
2. Through 1991, an estimated $212 million in CAFE penalties will have been paid. All of those penalties are borne by 8 manufacturers, reflecting only 3% of the market share;

3. Based upon 1989 model mixes, 50.6% of all vehicles failed to meet the 1989 CAFE standards. Only 3% of those models were assessed CAFE penalties.

The current CAFE program does not encourage use of the available fuel efficient technology in each model. Indeed, it is often cheaper and easier to downsize a vehicle than to use fuel efficiency technologies.

The current CAFE system does not maintain consumer choice. Rather, it forces the full line manufacturer to build those vehicles which allow it to meet the CAFE requirements rather than those that the consumers demand. There are legitimate consumer needs for vehicles with varying performance characteristics including vehicles which have four wheel drive, large interior volumes and high horsepower.

It is our understanding that you are seeking to explore CAFE alternatives including the volume average fuel economy ("VAFE") concept. We believe the shift in focus from a corporate averaging concept to developing fuel economy standards for vehicles by models or performance characteristics is proper. Such a shift would allow a CAFE program to meet all the criteria set forth above.

We believe, however, that a focus on volume alone is misdirected. Based upon analysis of the 1989 model fleet, it is evident that volume has little relationship to fuel consumption. Based upon our analysis, volume accounts for only 1% of the change in fuel consumption, all other factors being equal. We believe a market segment CAFE based upon utility and performance characteristics, including size, may address this issue.

Porsche strongly endorses the provisions in your proposal which would give knowledgeable people in the Department of Transportation responsibility for determining new fuel economy goals. Doing so on a market segment or model specific basis, we believe, would achieve real fuel efficiencies in the broadest possible array of models while still preserving consumer choice.

We believe that the listed criteria considered by the Secretary in setting fuel efficiency standards should be those criteria which are most responsible for fuel consumption.

Very truly yours,

Luke Baer,
Vice President/
General Counsel

LB/isvb

COMMENTS OF AMERICAN SUZUKI MOTOR CORPORATION
ON
TITLE XI, SUBTITLE A, "CORPORATE AVERAGE FUEL ECONOMY,"
OF
S.341 "THE NATIONAL ENERGY SECURITY ACT OF 1991"
SUBMITTED IN CONNECTION WITH
THE FEBRUARY 28, 1991 HEARING
OF THE
SENATE ENERGY AND NATURAL RESOURCES COMMITTEE

American Suzuki Motor Corporation ("ASMC"), with headquarters in Brea, California, respectfully submits the following comments concerning the Corporate Average Fuel Economy ("CAFE") provisions in Title XI of S.341, "The National Energy Security Act of 1991," in connection with the February 28, 1991 hearing of the Senate Energy and Natural Resources Committee. ASMC is the authorized importer and distributor in the continental United States of Suzuki automobiles imported from Japan and Canada.

ASMC's parent company, Suzuki Motor Corporation, for years has made fuel efficiency a top corporate goal and a primary ingredient of its marketing strategy. Reflecting this commitment, Suzuki-produced automobiles have received the number one fuel efficiency rating in the United States from EPA for model years 1986-1991 in both the passenger car and gasoline-powered light truck categories. For 1989-1991, the

Suzuki-produced GM Metro passenger car had an unadjusted EPA rating of 59.2/74.7 mpg. Suzuki has used all significant available advanced technology, aerodynamic designs, and light weight materials to improve the fuel economy of its automobile fleet. As a result, Suzuki had the highest EPA CAFE number for passenger cars in the past few years.

ASMC understands the desire for further improvements in automobile fleet fuel efficiency because of concerns about oil imports and global warming. ASMC does not oppose legislation to advance these goals, as long as (a) the same requirements are applied to all manufacturers, and (b) the requirements are reasonable and effective.

In ASMC's view, the Corporate Average Fuel Economy program proposed in S.341 is not an appropriate means to achieve these goals. The "percentage increase" approach in S.341 is counterproductive to improving fleet fuel efficiency and is harmful to the American consumer and to competition. Also, this approach discriminates against high mileage manufacturers and is particularly harmful to recent market entrants selling the highest fuel economy vehicles, such as ASMC.

I. The Percentage Increase Approach is Unfair and Counterproductive

The approach of requiring each manufacturer to increase its fleet's fuel economy by a percentage over the corporate average fuel economy level it achieved in a previous model year is a radical departure from traditional legislative approaches. Legislation concerning automobile safety and emissions has always imposed a single requirement for all manufacturers to meet. S.341 would require companies which achieved higher fuel efficiency levels in 1990 to achieve new levels higher than other manufacturers, involving both greater absolute increases than required of other manufacturers and an ever-widening disparity between them in fuel efficiency. Even if DOT were to determine, under the guidelines in S.341, that only relatively small percentage increases in overall fleet fuel efficiency are feasible by 1996 and 2002, companies with the best past performance would be punished. Suzuki has no significant "technological headroom" of available but unused technology or weight reduction techniques to accomplish any significant increase in its CAFE performance. Imposing a high mpg requirement on Suzuki because of its past good performance would seriously harm Suzuki.

Additionally, it is wishful thinking to believe that overall fleet fuel economy increases can be greatly enlarged by requiring each manufacturer to increase its CAFE performance by a percentage over its 1990 performance. Various predictable actions and inactions of those affected would undercut the realization of the projected benefits of this discriminatory approach.

For instance, requiring manufacturers who exceeded minimum CAFE requirements in the past to meet higher CAFE requirements in the future would provide a strong motivation to low CAFE manufacturers not to exceed their minimum requirement, for fear of establishing a benchmark for higher future requirements. This would be harmful to fuel economy and to competition.

Also, consumers may well undermine achievement of the projected benefits. Manufacturers that are pushed to achieve relatively higher fuel economy will incur costs that will result in higher price tags and other trade-offs. Because of this, consumers may shift their demand from vehicles sold by higher mileage manufacturers to vehicles sold by lower mileage manufacturers to avoid costs and undesirable trade-offs, undermining the goal of improved fuel efficiency.

Additionally, the S.341 approach would preclude producers of the most fuel efficient vehicles from certain segments of the market. S.341 would prevent manufacturers with higher CAFE ratings in the 1990 model year (such as Suzuki) from upsizing (to subcompact, compact, or mid-size automobiles, depending on the manufacturer), and may even require further downsizing. This would exclude from major segments of the auto market the manufacturers which have been the most aggressive in improving fuel efficiency. Given the needs of consumers for various size cars, such cars will continue to be purchased. The net effect of S.341 would not be to reduce the number of such cars sold, but only to exclude from certain segments of the automobile market those manufacturers with the greatest demonstrated capacity and resolve for achieving fuel efficiency improvements.

Further, S.341 would put great pressure on manufacturers to engage in "gaming" to adjust to requirements in ways that do not improve overall U.S. fuel economy. Different manufacturers would be subject to different mpg requirements, and the high mileage producers would be subject to requirements that may be impossible to meet. This would create a great incentive for all companies to enter into arrangements like "rebadging" and other approaches to transfer vehicles from the CAFE accounts of high mileage producers to the CAFE accounts of low mileage producers. This would undermine achievement of higher fuel economy benefits while creating additional costs and possibly reducing competition in the automotive industry.

Taken together, these factors indicate that the enhanced U.S. fuel economy benefits expected from applying discriminatory CAFE requirements to manufacturers that have achieved higher CAFE performance in the past are ephemeral. Given this fact, there is no valid reason to adopt an approach that is discriminatory and anticompetitive.

II. S.341 Harms Consumer Interests and Restricts Competition

New entries into the U.S. auto market over the past twenty years have brought great benefits to American consumers by providing new product offerings and by putting much greater pressure on U.S. domestic manufacturers to be responsive to consumer interests. Because S.341 would make it difficult -- if not impossible -- for additional entrants to compete in the mid-size market, it will harm consumer interests. It will provide fewer choices. And, by giving current mid-size car manufacturers the security of knowing that they need not fear new competition in the mid-size market segment, it will reduce the critical competitive pressure needed on those manufacturers to improve their product offerings. Consumer choice will be limited not only with respect to various fuel efficiency approaches but also with respect to other product features. The Department of Justice, commenting on a bill in the last Congress containing the "percentage-increase-over-base year" approach, stated that this approach "may limit competition in the sale of larger vehicles, and even undermine fuel efficiency goals. . . . [C]ompetition would suffer and fuel efficiency of a whole category of vehicles could be kept artificially low." See Attachment A.

III. S.341 Discriminates Against Recent Market Entrants Producing High Mileage Vehicles, Such as ASMC

Beginning in the 1986 model year, Suzuki produced fuel-efficient passenger cars for General Motors which have won the number one EPA mileage rating each successive year. In model year 1989, ASMC launched the sales of passenger cars under the Suzuki name in the continental U.S. with a new passenger car model line. This new model line is the Suzuki Swift, a very fuel efficient subcompact passenger car. Other high mileage companies have also entered the U.S. market in recent years.

ASMC plans over the next few years to introduce new passenger car models. These new models are absolutely necessary if ASMC is to survive in the U.S. auto market. Without a significant market presence, ASMC will find it difficult, if not impossible, to attract and maintain a viable dealer network to handle its automotive products. Consistent with Suzuki's expertise, the new models ASMC plans to introduce are expected to be relatively small and highly fuel efficient. However, in order to meet consumer needs, such cars must be somewhat larger and, though probably more fuel efficient than competitors' comparable automobiles, less fuel efficient than Suzuki's existing models.

The effect of S.341 would be to freeze ASMC and certain other new market entrants in the smallest-car segment of the market. Suzuki has adopted available advanced technology, aerodynamic designs and light weight materials, and has no significant "technological headroom" to further increase the fuel efficiency of its motor vehicles. Even with its existing lines, Suzuki cannot significantly increase its fuel economy. Further, imposing a discriminatorily high CAFE requirement on Suzuki would mean that ASMC would not be able to expand its very limited model lines to establish a significant market presence. Current full-line manufacturers, however, could still participate in all market segments. For the first time, CAFE legislation would discriminatorily control which manufacturers are allowed to produce certain classes of vehicles. And this could well preclude recent entrants from remaining in the U.S. motor vehicle market.

Attachment A

U.S. Department of Justice

Office of Legislative Affairs

Office of the Assistant Attorney General

Washington, D.C. 20530

JAN 2 6 1990

Honorable Richard H. Bryan
Chairman
Subcomittee on Consumer
Committee on Commerce, Science and Transportation
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

This is to offer the views of the Department of Justice on S. 1224, the "Motor Vehicle Fuel Efficiency Act of 1989." This bill would amend the Motor Vehicle Information and Cost Savings Act to require new standards for corporate average fuel economy.

S. 1224 requires manufacturers to increase the average fuel economy of their cars and trucks, first by 20 percent above their 1988 levels and ultimately by 40 percent. In effect, S. 1224 requires firms that have achieved the highest fuel economies to make the biggest fuel economy improvements. By increasing fuel economy requirements in this manner, S. 1224 may limit competition in the sale of larger vehicles, and even undermine fuel efficiency goals. Manufacturers with high average fuel economies will be impeded in entering U.S. markets for larger cars because such entry -- even if they produce more efficient larger cars than are currently available -- could prevent them from meeting the new standards. Thus, competition would suffer and the fuel efficiency of a whole category of vehicles could be kept artificially low.

Fuel efficiency generally may be undermined by instituting a system that is disadvantageous to firms that comply with or exceed current standards. By setting standards through a percentage increase over each firm's 1988 level, S. 1224 could require high-fuel-economy firms to develop very difficult and expensive technologies while allowing firms with lower average fuel economies to avoid the expense of applying even basic technologies that other manufacturers may have used for years. Thus, the methodology of S. 1224 discourages relatively inexpensive ways to improve fuel efficiency, requires other relatively expensive measures to be taken, and raises the costs of attaining any particular national fuel economy level. Moreover, this approach discourages widespread adoption of those innovations that are developed to further improve the fuel economy of the firms that currently are the most fuel efficient.

The Office of Management and Budget has advised this Department that there is no objection to submission of this report from the standpoint of the Administration's program.

Sincerely,

Carol T. Crawford
Assistant Attorney General

STATEMENT OF NISSAN NORTH AMERICA, INC.
TO THE
SENATE ENERGY & NATURAL RESOURCES COMMITTEE
ON
TITLE XI, SUBTITLE A OF S. 341,
THE NATIONAL ENERGY SECURITY ACT OF 1991

EXECUTIVE SUMMARY

Nissan supports the goal of improving the fuel efficiency of the nation's automotive fleet. Energy conservation makes good sense from both energy security and environmental viewpoints. A more efficient motor vehicle fleet should play an important role in a comprehensive national energy policy.

Nissan will support government efforts, as part of a comprehensive national energy policy, to establish new fuel efficiency standards for motor vehicles that meet the following criteria: actually reduce energy consumption and carbon dioxide emissions; be technologically feasible and cost-effective, and provide adequate lead time to comply; promote the adoption of fuel efficient technologies and weight reduction by all manufacturers; avoid anti-competitive effects; and allow manufacturers to meet consumer needs and other regulatory demands.

S. 341 meets some but not all of these criteria. Most importantly, S. 341 would set different standards for different manufacturers and thereby trigger severe anti-competitive consequences that would render the legislation self-defeating. We urge the Committee to abandon the "percentage increase" approach and to embrace instead an approach that would set standards for each market segment class of vehicles. Nissan is willing to work with the Committee in refining this approach or any alternative approach that meets our criteria.

Part I of Nissan's statement addresses the merits and drawbacks of the CAFE provisions of S. 341. Part II responds to the the issues laid out by the Committee that individuals preparing statements were requested to address.

INTRODUCTION

Nissan North America, Inc. is a wholly-owned subsidiary of Nissan Motor Company, Ltd. of Japan, the world's fourth largest producer of motor vehicles. We are a company well on its way to becoming a fully integrated U.S. manufacturer. We employ nearly 5,500 people in our U.S. manufacturing operations and we will soon have capacity to produce 450,000 vehicles annually in the United States. Total employment by other Nissan subsidiaries in the United States will reach more than 11,000 by the mid-1990's, including those employed in vehicle design and engineering, sales and marketing. 1,200 Nissan dealers throughout the country currently employ over 47,000 more people. Simply put, Nissan has made a major commitment to the U.S. market. Thus we appreciate this opportunity to provide our views on the Corporate Average Fuel Economy (CAFE) subtitle of S. 341, Senator Johnston's comprehensive energy policy legislation.

Nissan is strongly committed to improving fuel economy. Our objective is to build high quality, fuel efficient vehicles that offer consumers an excellent value for their automotive dollar. Nissan has exceeded CAFE standards every year for both our car and light truck fleets. Our passenger car CAFE in 1991 is projected to exceed our 1990 CAFE level, and our light truck CAFE is the highest of any major automotive manufacturer. We have never sought to reduce or repeal the standards. And we have never used any of the CAFE credits we have earned by exceeding the standards.

Nissan will support government efforts to establish fuel economy standards that meet certain key criteria and thus qualify as a responsible approach to regulating automotive fuel efficiency. Any new standards must be part of a comprehensive national energy policy that takes into account the realities of the market. Also, new standards should:

- actually reduce energy consumption and carbon dioxide emissions;
- be technologically feasible and cost-effective, and provide manufacturers adequate lead time to comply;
- promote the development and adoption of fuel efficient technologies and weight reduction by all manufacturers;
- avoid anti-competitive effects; and

- allow manufacturers sufficient flexibility to meet consumer needs and comply with competing regulatory requirements.

S. 341 does a better job of meeting some of these criteria than S. 279, "The Motor Vehicle Fuel Efficiency Act." However, S. 341 embodies the same anti-competitive, fundamentally flawed approach as S. 279, that of setting different standards for different manufacturers. Nissan strongly opposes this approach, and thus cannot support S. 341 in its present form.

Senator Johnston, in his introductory remarks on S. 341, stated that "all CAFE options should be on the table." Therefore we urge the Committee to abandon the "percentage increase" method, and to give full consideration to an alternative based on standards for each size or market segment class of vehicles, which avoids these anti-competitive effects.

PART I. NISSAN'S VIEWS ON THE CAFE PROVISIONS OF S. 341

A. S. 341 HAS SEVERAL COMMENDABLE FEATURES

We applaud the Energy Committee for adopting a comprehensive approach to energy policy. We also applaud the Committee for incorporating the following elements into its CAFE program:

- Requiring a careful technical analysis of maximum feasible potential for improving fuel economy in determining the appropriate level of new standards.
- Considering separately passenger car and light truck fuel economy improvement potential.
- Using the most recent complete model year (1990) performance levels, size mix and interior volume, which best represents current consumer preferences and manufacturers' present model lineups. (In this regard, S. 341 is clearly preferable to S. 279, which relies on 1988 as a baseline.)
- Taking into account the industry's need to meet applicable emission control and safety standards.

- Permitting an expanded credit trading program, which gives manufacturers greater flexibility to meet the needs of consumers, while the fleet as a whole is still required to meet the overall fuel efficiency target.

HOWEVER, BY SETTING DIFFERENT STANDARDS FOR EACH MANUFACTURER, S. 341 EMBRACES A FATALLY FLAWED APPROACH TO FUEL ECONOMY REGULATION

The most serious flaw in S. 341 is the way it would regulate fuel economy in the future, by setting different standards for each manufacturer. From that basic error flows the undesirable consequences of S. 341: its anti-competitive effects and its inability to achieve the very energy savings it seeks.

1. Setting Different Standards for Each Manufacturer is a Fundamentally Flawed Approach to Government Regulation.

Setting different standards for each manufacturer would be a radical departure from every other federal regulatory program. Such an approach would "punish" superior performance by assigning ever-more stringent standards to superior performing companies, even when that performance reflects a more aggressive use of advanced technologies. And it would "reward" lower performance by setting easier standards for those companies producing less fuel-efficient fleets.

The flaw in this regulatory philosophy becomes apparent when its consequences are considered. Depending on the ultimate standard, Nissan could be penalized for achieving a CAFE 10 mpg above another manufacturer, while the other manufacturer could be rewarded (that is, could be earning credits).

2. Setting Different Standards for Each Manufacturer Will Have Significant Anti-Competitive Consequences, Particularly for Manufacturers With a High Rate of Use of Advanced Technology.

Nissan and other high mileage manufacturers have higher levels of average fuel economy in part due to differences in size mix, but also due to a higher rate of use of advanced fuel-saving technologies. (See Attachment 1.) The Office of Technology Assessment (OTA) pointed out the anti-competitive effects uniform percentage increase standards have on high-mileage manufacturers, in a statement to the Commerce Committee hearing record on S. 1224, in the 101st Congress (S. Hrg. 101-347):

> "the proposed structure may be vulnerable to claims that it is **inequitable and unfair.** The structure does not account for the fact that **at least a portion of the current differences in companies' CAFEs are due to ... the companies' different efforts at moving advanced technology into their fleets**. Our analysis of the fuel economy characteristics of various company fleets ... indicates that some companies have fleet fuel economies that are well above the industry average even when the effects of fleet size distribution are accounted for. Thus, this type of standard **penalizes manufacturers who have tried the hardest to increase their fleet fuel efficiency in the past.** They now have the most difficult technological challenge, because they have already "used up" a larger portion of the technological headroom available to them from off-the-shelf technology. Companies that have hesitated to use the best available technologies ... are instead rewarded by being presented with the lowest efficiency target. Furthermore, there is the possibility that consumers may not place a high value on the increased levels of fuel efficiency, and thus may tend to prefer lower efficiency vehicles from the "favored" companies, because their price tags don't include the costs of the most advanced technologies. Also, it is possible that companies that wind up with the lowest efficiency targets could use the leeway these lower targets afford them to increase vehicle performance to levels that companies with higher efficiency targets may not be able to match (because higher performance reduces fuel efficiency). If either of the latter two outcomes occur, **we have not only rewarded the lower efficiency automakers with an easier target, but have given them a market advantage as well."** (Emphasis added.)

Even if S. 341 were to lead to adoption of lower "percentage increase" requirements than the 20% and 40% improvements called for in S. 279, the differential standards would still produce anti-competitive effects. Less stringent percentage increase standards could, in all likelihood, be met by lower mileage manufacturers simply by using the most cost-effective existing technologies that Nissan and other higher mileage companies are already using. They would not be forced to sacrifice vehicle size and performance to any significant extent. Because of its already high penetration of technology, Nissan, in all likelihood, would be forced to commercialize unproven technology to meet even less stringent standards, as well as downsize and reduce performance. Thus, lower targets would still make our cars more costly and less attractive than vehicles sold by lower mileage companies. Unrealistically stringent standards (such as in S. 279) would force every manufacturer, at least to some degree, to commercialize costly and unproven technology.

3. Setting Different Standards for Different Companies Will Not Achieve Intended Fuel Savings.

S. 341 can achieve its overall fleet fuel economy goal only if all higher mileage manufacturers retain their 1990 market share. The approach itself makes that very condition impossible, however. As a result, the fuel economy gains the bill seeks will not be realized.

The reasons why this approach is self-defeating are clear in the logic of OTA's submission to the Senate Commerce Committee, previously quoted. Giving a market advantage to lower mileage manufacturers would enable them to gain market share at the expense of higher mileage manufacturers. Lower mileage manufacturers could increase their utilization rates of fuel saving technologies already in use by higher mileage manufacturers, enabling them to meet the lower standards that apply to them without having to resort to downsizing and reducing vehicle performance. Higher fuel efficiency manufacturers, faced with more stringent standards, would be forced to embrace expensive, unproven technologies, to downsize, and to reduce performance.

In a very competitive marketplace, sales of vehicles that cost more, have reduced performance, and fail to meet consumer needs would lose out. More vehicles that are subject to less stringent standards would be sold, and fewer vehicles subject to more stringent standards will be sold. The result would be that the fuel savings anticipated by S. 341 would not materialize.

In addition, the uniform percentage increase approach, by failing to provide a mechanism for the equitable treatment of new market entrants, also creates substantial opportunities to defeat the energy savings target. For example, the uniform percentage increase could virtually eliminate higher mileage, light truck manufacturers from the light truck market (see point 4 below for a full explanation). This likelihood of product restrictions for current truck manufacturers would create significant sales opportunities for manufacturers that have the capability to produce trucks, but have not sold light trucks in the U.S. in recent years. "New" companies could enter the U.S. truck market relatively free of CAFE constraints, and with a significant competitive advantage. If the market shifts to towards manufacturers that can make less fuel-efficient products because they have a lower CAFE to meet, anticipated fuel savings would be substantially reduced.

A similar phenomenon might occur in the passenger car market. Lower fuel economy manufacturers could form joint ventures with higher mileage manufacturers, under which the lower mileage company would market vehicles produced by the higher mileage company. The lower mileage company's lower fuel economy standard would, in effect, become a saleable asset in such arrangements.

Again, these types of strategies would be quite natural responses to the percentage increase approach by companies in a highly competitive marketplace. No doubt other, even more imaginative, strategies would evolve. None would produce any real fuel economy benefits.

4. Setting Different Standards for Each Manufacturer Will Have Especially Severe Consequences in the Light Truck Market.

The fact that trucks carry payloads imposes certain design limitations. These limitations mean that the potential to improve the fuel efficiency of trucks is less than that for cars. For example, front wheel drive is an effective fuel saving technique for cars that is not suitable for trucks because a truck's drive wheels should be situated under its payload.

S. 341 recognizes the functional differences between passenger cars and light trucks by permitting separate evaluation of their fuel economy improvement potential. However, the uniform percentage increase approach does not take into account the essential difference between lower mileage and higher mileage light truck manufacturers: higher mileage makers offer only compact truck models while lower mileage makers sell both compact and full-size models.

To meet the same percentage increase as lower mileage companies, Nissan and other higher mileage manufacturers would be required to downsize their trucks.

This would put their trucks into a market segment that now does not exist. Lower mileage manufacturers, on the other hand, could apply fuel saving technologies already in use by higher mileage manufacturers and expand sales in the compact market segment that higher mileage companies would be forced to abandon. As a result, S. 341 could virtually eliminate the higher mileage manufacturers from the light truck market. Consumer choice could be restricted severely.

This point was made in a February 12, 1991 letter from DOE Deputy Secretary W. Henson Moore to House Energy & Commerce Committee Chairman Congressman John Dingell on S. 1224:

> "Downsizing or performance reductions will be necessary to achieve the levels of S. 1224, for cars and light trucks. This is a particular problem for light trucks where performance reductions are less feasible. **For import light truck manufacturers, downsizing is a very limited option** since their product lines contain few or no larger vehicles. **This may be the single most difficult-to-achieve requirement** of S. 1224." (Emphasis added.)

(For purposes of CAFE, "import light truck manufacturers" includes Nissan, even though a substantial portion of our U.S. light-truck fleet is produced in Tennessee.)

B. ALTERNATIVE APPROACHES CAN ACHIEVE ENERGY SAVINGS AND AVOID THE PITFALLS OF THE DIFFERENTIAL STANDARDS APPROACH.

Given the fatal flaws inherent in an approach that sets different standards for each manufacturer, the Committee should consider alternative approaches. Analysts in the Office of Technology Assessment have pointed to a preferable alternative: standards based on vehicle size or market segment classes that would treat manufacturers in a like manner regardless of the number of lines they offer or the product mix of their fleets.

The President's National Energy Strategy (NES) points in the same direction. The Executive Summary of the NES suggests that the Administration may consider establishing an alternative form of corporate average fuel economy standard once its comprehensive analysis of fuel economy is completed. The NES identifies standards based on vehicle size, not uniform percentage increase, as the alternative it is considering.

It is also worth noting that the National Academy of Sciences (NAS) study commissioned by the Department of Transportation on the potential for future fuel economy improvements focuses on the improvement potential by size classes of vehicles rather than for individual manufacturers. This study design was chosen to avoid anti-competitive conclusions.

Size or segment based standards meet each of the criteria we have outlined as constituting a responsible approach to regulating automotive fuel efficiency. The advantage of this approach is that vehicles would compete head-to-head in classes where the standards are directly related to the past performance in that class. There would be no discrimination among manufacturers and therefore no anti-competitive effects.

We are prepared to cooperate fully with the Energy Committee to further refine a size or segment based alternative concept. We propose that work proceed along the following principles:

- Standards would be set for the seven traditional market segment classes of passenger cars and six classes of non-passenger vehicles (light trucks, vans, and sport utility vehicles). (See Attachment 2.)
- Standards would be set using available data from the most recent year in which complete data is available (at present, 1990 MY). The average fuel economy for each market segment would be determined for the base year. Standards would be set by applying the same improvement task to each class. Consistent with S. 341, the improvement task could be determined by DOT on the basis of an analysis of average, industry-wide capability.
- Credits for exceeding the standards in any one market segment could be earned by a manufacturer and transferred to another market segment as well as to another manufacturer, similar to what is proposed in S. 341. This would give manufacturers flexibility to meet the needs of consumers while the fleet as a whole would still meet the overall fuel efficiency target.

We acknowledge that concerns have been raised that the market segment approach would permit unrestricted growth in the sale of larger vehicles, and thus cannot guarantee that energy savings would result. We believe these concerns are unwarranted. Nevertheless we are prepared to support the adoption of measures to complement the market segment approach to ensure the intended savings would be realized.

We believe the concerns are unwarranted primarily because of evidence that consumer demand for vehicle size is, on average, relatively constant. Data from the Oak Ridge National Laboratory shows that average interior volume of the nation's vehicle fleet has remained quite stable -- with a range of plus-or-minus two percent -- from 1977 to 1990. (See Attachment 3.) Considering the variation in circumstances over that period -- from no fuel economy standards to the current standards, through rising and falling gasoline prices, through oil embargoes, through economic downturns and upturns -- this stability is remarkable. It suggests consumers will continue to demand a mix of all vehicle sizes, and that the marketplace will assure that such a mix continues to be supplied.

Even so, market segment standards could be combined with a "floor" standard and/or with market-based incentives to stimulate consumer demand for fuel-efficient vehicles, thus employing both a "carrot and stick" approach. A credit scheme could also be devised to help restrain overall vehicle size growth.

PART II. INFORMATION IN RESPONSE TO COMMITTEE STAFF QUESTIONS

A. DETERMINING MAXIMUM FEASIBLE MPG

Nissan agrees that all of the assumptions described in S. 341 and addressed individually below are essential in order to make a valid appraisal of maximum feasible average fuel economy. We also have the following points to make on individual assumptions.

Technology Assumption:

The Committee requested information on technologies that are capable of being commercialized in the near and long term. Most of the proven fuel efficient technologies were already adopted into Nissan's fleet by 1990, thus limiting our improvement potential in the near term. Further adoption of technologies whose penetration is relatively low (e.g., roller rocker arms for OHC engines, variable valve timing control) is also planned. However, employing some of those technologies will require major changes in our manufacturing facilities, so that substantial lead time will be needed to implement the changes.

Nissan has research efforts underway to develop certain types of new technologies for use in vehicles after the year 2000. Specifically, we are working to develop promising modifications of gasoline-powered engines (for example, lean-burn, stratified intake, etc.). There is still considerable work to be done before wide-scale usage of these engines is feasible, such as assurance of their driving and exhaust emission performance.

We also have research devoted to alternative fuels, such as methanol, compressed natural gas, electric power, and hydrogen. There are as-yet unresolved technical issues associated with the successful introduction of these technologies (such as driving range and fuel safety). They also hold important infrastructure implications.

In the meantime, our efforts will focus on improvements to current engines and vehicles. But the opportunities for improvement are incremental in nature, since the large gains have already been made. We are concentrating our efforts to achieve improvements in the following areas:

- Variable valve lift
- Higher compression ratio
- Improved control systems for combustion, EGR, etc.
- Increased number of gears (such as 5-speed automatic transmission, continuously variable transmission)
- Reduced tire rolling resistance
- Reduced friction (piston rings, transmission, oil, etc.)
- Reduced aerodynamic resistance
- Higher efficiency for accessory components
- Weight reduction (for all parts) -- such as streamlining component designs to reduce the number of parts, thinning, hollowing, adopting new materials, etc.

In Nissan's view, the total fuel economy benefit that we can reasonably expect to achieve using all of these methods, taking into account the offsetting effects of new environmental and safety requirements, is significantly less than would be required to meet new fuel economy standards that have been proposed in S. 279.

Performance Assumption: Like most vehicles produced by Asian manufacturers, Nissan's products have increased in average performance levels in recent years. Most Asian imported autos had lower than average performance in the past. Their performance is now compatible with the fleet average.

Nissan's trend toward higher performance levels has been part of an overall trend, as our vehicles have entered the "mainstream" of the United States auto market. At the same time, we are striving to offer our customers the best balance of performance, fuel economy and other attributes. This is especially true in the years 1988-90, when our Corporate Average Fuel Economy declined slightly but when, on a model-by-model basis, improvements in fuel economy and performance were achieved simultaneously. (See Attachment 4.) These seemingly incompatible improvements were possible through the use of advanced technology.

Size Assumption: Data compiled by DOE's Oak Ridge National Laboratory (see Attachment 3) demonstrates the remarkable stability of average interior volume over time. We would not expect significant changes in this trend in the near future for any reason, unless exceedingly restrictive CAFE standards are enacted by Congress.

Emissions Assumption: Nissan cannot predict what impact the Tier II Clean Air Act tailpipe emission standards will have on our fleet fuel economy, because at present time we do not know what technology will be required to meet those significantly lower standards. A substantial portion of our engineering manpower and resources is currently assigned to the task of ensuring compliance with Tier I standards. Therefore, we do not have information which would be helpful in quantifying the fuel economy relationship between Tier I and Tier II standards.

Safety Assumption: Nissan believes it is possible to produce small cars with excellent levels of safety performance, and this belief has always been central to our design philosophy.

The relationship between performance levels and safety is not straightforward. Many drivers perceive their vehicle's acceleration performance as a safety benefit, permitting safe merging into 65-mph expressway traffic, for example.

Nissan is committed to offering enhanced safety features such as air bags and anti-lock brakes across our product line, including on our higher performance and smaller vehicles. And all of our vehicles are designed in full compliance with federal safety requirements.

Cost-Effectiveness Assumption: As stated previously, S. 341 is an improvement over S. 279 in that it specifies important assumptions to be considered in determining maximum feasible fuel economy. However, Nissan would favor the inclusion of an explicit cost-effectiveness assumption in the list of assumptions for determining the maximum feasible average fuel economy.

The Motor Vehicle Information & Cost-Savings Act already requires the Secretary of Transportation to take into account "economic practicability" when considering the level of the standards. A cost-effectiveness assumption will further require the Secretary to take into consideration what may happen in the market absent a rise in gasoline prices. The higher cost of fuel efficient technology may not represent perceived value to the customer -- or more efficient cars may simply encourage people to drive more. CAFE standards that are not cost-effective may put manufacturers in conflict with their customers, slow down the turnover of the fleet, and frustrate our energy conservation objectives.

It should be noted that the differential standards approach embodied in S. 341 makes comparisons of "cost-effectiveness" across the industry extremely subjective. For example, a company with a high penetration of advanced fuel-saving technology has fewer cost-effective options to improve fuel economy than a manufacturer that has not yet diffused most technology into its fleet.

Lead Time Assumption: Nissan would favor moving the effective date of the first tier of additional fuel economy requirements to 1997 model year or later. It takes about seven years to turn over our current model lineup with new models incorporating the technologies that are now under development at Nissan. This amount of time will permit more orderly planning for new fuel economy requirements.

B. TRANSLATING MAXIMUM FEASIBLE AVERAGE FUEL ECONOMY INTO MANUFACTURER-SPECIFIC STANDARDS

As previously noted, the uniform percentage increase approach does not provide a mechanism for equitable treatment of new market entrants and thus provides incentives for "gaming." These types of strategies do not produce fuel economy benefits. Due to the inherent flaws in the percentage improvement approach, the approach cannot be "fixed." So long as different standards are applied to individual companies, there would always be an incentive for someone to sell as many vehicles as possible under less stringent standards.

The logical way to set standards for new entrants under a percentage improvement approach, in an attempt to avoid the above pitfalls, would be to examine the type of vehicle to be offered by the entrant and set the entrant's standard at the average fuel economy of vehicles in the same class. Of course, this is exactly the way standards would be set under the size class based approach, and provides a compelling argument for establishing a size class based program in the first place.

C. LEGISLATIVE VS. ADMINISTRATIVE DECISION-MAKING

Nissan supports the general approach adopted in S. 341 for standard-setting. We believe that the process will work best if Congress establishes relatively detailed criteria and articulates policy judgments to be applied in the standard-setting rulemaking, and DOT is allowed to perform the detailed technical analysis.

The analysis required to determine maximum feasible average fuel economy is highly complex. The final conclusions depend on detailed technical and economic judgments, as well as the initial assumptions on vehicle size, performance, etc. We believe that DOT has the appropriate expertise to minimize the risks associated with setting inappropriate standards, and is capable of objectively determining future regulatory requirements for the motor vehicle industry. After DOT has completed its initial analysis, it can be subjected to public scrutiny during the rulemaking process.

In this way, all interested parties will have the opportunity to critique the technical and economic judgments made by DOT.

D. CAFE CREDIT TRADING

As mentioned previously, Nissan favors the expanded use of credits (such as between segments and between domestic/import categories, etc.) provided for in S. 341. However, the credits scheme proposed is insufficient to mitigate the anti-competitive effects of different standards for each manufacturer. We would favor incorporating this credit scheme into the alternative approach that we have suggested.

Two-Fleet Requirement: The current separate requirements for domestic and import fleets of the same manufacturer does have the potential to perversely affect sourcing decisions, by providing a disincentive to foreign-based U.S. manufacturers to maximize U.S. content. (Since Nissan imports Sentras at the same time that it produces Sentras in the United States, and the local content of the model line for purposes of CAFE is a product of the average between the two, we have not thus far been constrained by the two-fleet requirement.)

While the credit trading scheme provided for in S. 341 "implicitly" repeals the two-fleet domestic/import requirements that exist in current law, we believe our alternative approach provides a more fail-safe method of dealing with the two fleets. Under a market segment approach, the need for a two-fleet requirement is greatly reduced. Unlike the situation under the current "single number" standard, there would be little, if any, compliance benefit resulting from shifting production of small, fuel efficient vehicles out of the United States, for example. Such vehicles would be subject to a stringent, small vehicle standard, and would not be averaged together with larger vehicles. With other approaches, particularly in the absence of the Committee's proposed credit trading scheme, the effect of a vehicle changing from one fleet to another could jeopardize compliance with CAFE. We therefore believe that size or class based standards offer a preferable means of dealing with the two-fleet requirement than do percentage increase based standards.

E. NEW FEE STRUCTURE

Although Nissan has always been in compliance with CAFE, to a large degree compliance is related to marketplace demand and thus is beyond the full control of manufacturers. We would note that the potential influence of marketplace demand on a manufacturer's compliance status is minimized under our proposed market segment-based approach.

F. ALTERNATIVE FUEL CREDITS

Nissan favors the elimination of the cap which currently exists on the CAFE credit available for flexible fueled vehicles. This is consistent with the President's stated objective in the National Energy Strategy, and a similar amendment to S. 1224 was supported in a floor vote in the Senate last fall. If the stated objective is encouraging non-petroleum fuel usage, flexible fueled vehicles are an important transitional tool in moving the market towards that goal.

G. MARKET BASED INCENTIVES

Nissan continues to believe that to achieve energy conservation from the transportation sector, changes in consumer behavior are a necessary complement to higher fuel economy standards. We suggest that the Committee could enhance the potential impact of its transportation efficiency program by including market incentives such as gas guzzler/gas sipper fee/rebate programs.

ATTACH. 1: **Nissan's Penetration of Technologies to Improve Fuel Economy (Passenger Vehicles)**

TECHNOLOGIES TO IMPROVE FUEL ECONOMY	% PENETRATION							
	US MARKET AVERAGE (by OTA)	NISSAN						
	'87	'85	'86	'87	'88	'89	'90	'91
OVERHEAD CAM ENGINE	40.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MULTI VALVE (Including 3- & 4-valve)	5.0	0.0	0.0	2.2	3.7	71.3	75.9	76.4
FRONT WHEEL DRIVE	78.0	75.6	74.2	91.1	91.3	84.7	75.4	78.3
ROLLER CAM:	40.0	0.0	0.0	0.0	0.0	0.0	2.4	4.9
In OHV Engine (Tappets)	36	-----	-----	-----	-----	-----	-----	-----
In OHC Engine (Tappets or Rocker Arms)	4	0.0	0.0	0.0	0.0	0.0	2.4	4.9
VALVE TIMING CONTROL	N/A	0.0	0.0	0.0	0.0	0.0	8.9	40.0
FUEL INJECTION:	76.0	50.3	53.6	59.8	99.5	99.3	100.0	100.0
Throttle Body Injection	31.0	0.0	0.0	12.3	63.9	56.8	33.5	0.4
Multi Point Injection	45.0	50.3	53.6	47.4	35.5	42.5	66.5	99.6
4-SPEED AUTOMATIC TRANSMISSION	35.0	22.3 (45.8)	31.1 (65.8)	32.2 (59.2)	23.6 (46.3)	29.1 (52.1)	47.0 (78.7)	59.9 (90.0)
ELECTRONIC TRANSMISSION CONTROL	2.0	5.2 (10.6)	5.4 (11.4)	2.0 (3.7)	2.7 (5.2)	24.5 (43.8)	34.4 (57.5)	33.6 (50.4)
TORQUE CONVERTER LOCK-UP	N/A	47.9 (98.4)	47.2 (100.0.)	54.5 (100.0)	50.9 (100.0)	55.9 (100.0)	61.6 (100.0)	61.6 (100.0)

NOTES: Figures in parentheses show penetrations within A/T class.

ATTACHMENT 2

MARKET SEGMENT CLASSES

PASSENGER CARS

Minicompact
Subcompact
Sports
Compact
Mid Size
Large
Premium

LIGHT TRUCKS

Small Pickup
Large Pickup
Small Van
Large Van
Small Special Purpose Vehicle
Large Special Purpose Vehicle

ATTACHMENT 3
DATA FROM, OAK RIDGE NATIONAL LABORATORY, "LIGHT DUTY VEHICLE SUMMARY: FIRST SIX MONTHS OF MODEL YEAR 1990" (ORNL-6626/SI)

Table 16

Sales-Weighted *Interior Space of New Domestic and Import Automobiles* by Size Class

(cubic feet)

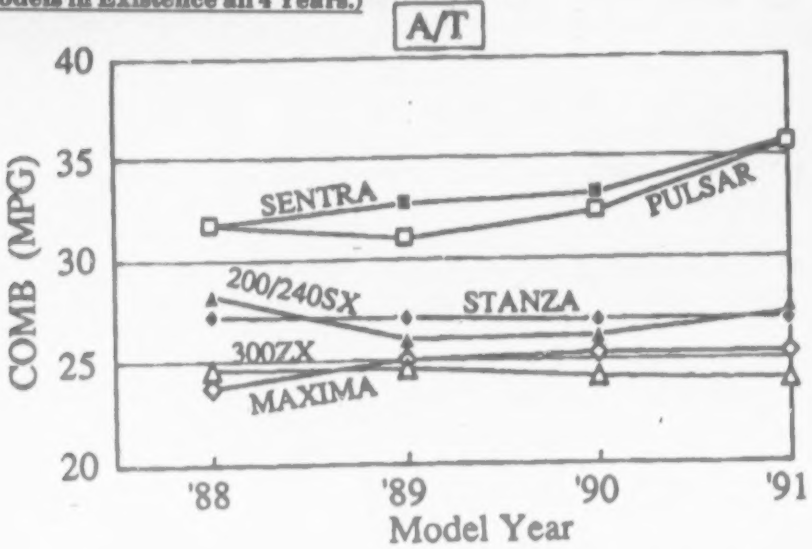
Model year	Minicompact (< 85)	Subcompact (85-99)	Compact (100-109)	Midsize (110-119)	Large (> 120)	Two seater[a]	Fleet
76[b]							
77	78.8	89.8	107.1	113.0	128.0		107.9
78	79.4	89.8	105.3	112.9	128.5		107.9
79	80.0	90.2	105.8	113.4	130.1		106.9
80	82.4	89.9	105.4	113.5	130.8		104.9
81	83.3	90.2	103.6	113.7	130.6		105.5
82	83.1	91.3	102.9	113.9	130.4		106.0
83	82.7	93.3	103.0	113.1	131.3		107.3
84	77.0	93.8	103.0	113.3	130.7		108,0
85	77.8	94.1	103.1	113.5	129.7		107.9
86	80.1	94.5	102.8	113.8	127.6		107.0
87	81.6	93.1	103.0	113.9	127.5		106.9
88	81.0	93.5	103.3	113.6	127.2		107.0
89	75.0	93.3	102.7	113.8	127.4		107.5
90[c]	80.4	94.3	103.1	113.8	127.9		107.4

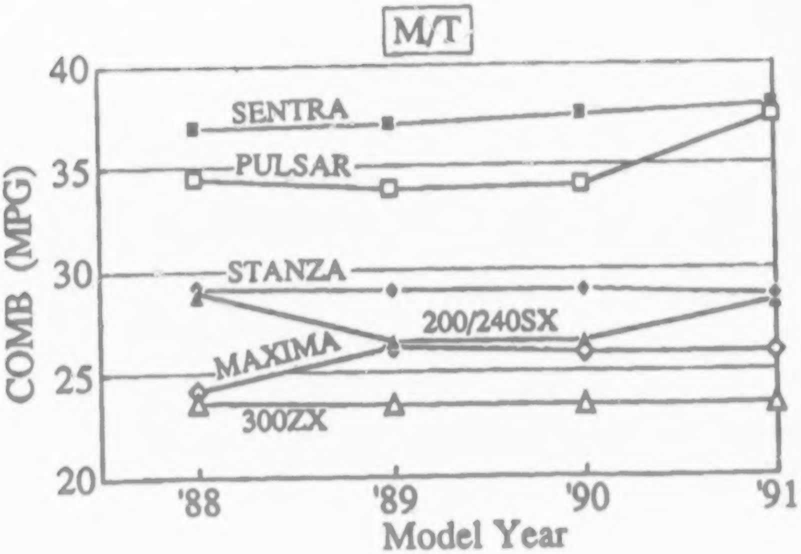
[a] Interior volumes of two seaters are not reported to EPA.

[b] Data not available.

[c] Represents sales for the first six months of model year 1990 (October through March).

ATTACHMENT 4
1988-91 Nissan Combined Fuel Economy Values
(for Models in Existence all 4 Years.)





MAR 15 REC'D

A subsidiary of BMW AG **BMW of North America, Inc.**

1991

REF: A:18091

14 March 1991

The Honorable J. Bennett Johnston
Chairman, Senate Committee on Energy and Natural Resources
US Senate
Room SH-364
Hart Senate Office Building
Washington, DC 20510-6150

Re: Proposed National Energy and Security Act of 1991 S.341

Dear Mr. Chairman:

The following represents BMW of North America, Inc. comments on S.341, National Energy and Security Act of 1991, which was the subject of a hearing before the Senate Energy and Natural Resources Committee on 28 February 1991.

BMW has its principal place of business in Woodcliff Lake, New Jersey, and is the sole factory-authorized importer of BMW automobiles and motorcycles into the United States. We serve only a small segment of this country's market; however, the products we offer to our discerning customers are considered to be on the leading edge of the industry.

We would first like to commend you on the rational approach for deciding on CAFE standards described in your bill. It is relatively easy to just pick a number, without performing a careful analysis of what is appropriate. Your bill has outlined a method of decision-making which will encourage a reasoned approach.

At the recent hearing, the Association of International Automobile Manufacturers (AIAM) made a statement which indicated that BMW did not agree with the AIAM position. We would like to take this opportunity to clarify BMW's position on whether CAFE legislation should require a percentage increase in fuel economy.

Address
BMW Plaza
Montvale, New Jersey 07645-1686

Telephone
(201) 573-2100

Fax
201-930-8401

BMW understands, and, indeed, agrees with the necessity for all manufacturers to improve the fuel economy of their vehicles. An EPA report on "Downward Trend in Passenger Car Fuel Economy - A View of Recent Data" indicated that BMW was the only manufacturer to show an overall improvement in fuel economy between 1988 and 1990.

The CAFE program as currently structured does not really require that all manufacturers improve the fuel efficiency of all of their products. The problem is that CAFE is constructed with an averaging concept which is designed around the capabilities of a full line manufacturer. Limited line manufacturers, such as BMW, are not able to take advantage of this averaging concept, even though their vehicles' fuel economy ratings are similar to vehicles of like class which are produced by full line manufacturers.

The result is that more than 50% of the automobiles sold in calendar year 1989 had fuel economy values of less than 27.5, but less than 3% of those vehicles were subject to CAFE penalties.

In fact, 100% of the CAFE penalties are borne by those European limited line manufacturers whose total US market share is less than 3%. By placing such a large financial burden on such a small number of manufacturers, CAFE currently gives an undue competitive advantage to full line manufacturers who can produce and market all types of products without that burden.

BMW customers have many choices in the marketplace, and among those choices are similar vehicles whose manufacturers are not paying CAFE penalties. This gives those manufacturers a significant competitive advantage, even though these manufacturers' models that compete with BMW are no better in fuel economy. BMW is concerned about such market distortions which directly affect our customers' decisions.

The limited line manufacturers who are unable to "play the averaging game" are often the very manufacturers who voluntarily lead the industry in the implementation of safety and environmental technologies: these technologies are the ones which then later penetrate through the rest of the industry.

Should the limited line manufacturers find some of their products so competitively disadvantaged as to be virtually forced out, other manufacturers who are able to "play the averaging game" will quickly substitute vehicles of this type. Of course, those manufacturers with an abundance of fuel economy credit would be most likely to take advantage of such substitutions. Thus, the net effect is to reduce competition, and arbitrarily substitute one manufacturer's vehicles for another's, and, as a result, there will be no net improvement in fuel economy.

This is, however, not to suggest that limited line manufacturers should be able to avoid fuel economy improvements. They should not. Indeed, all manufacturers should work toward upward trends in their fuel efficiencies. Most, however, show a trend in the opposite direction.

We therefore believe strongly that the CAFE program needs reform, with the following objectives:

- Program should lead to overall fuel economy improvement and should improve fuel economy for each manufacturer.
- Program should be technologically and economically feasible.
- Program should promote safety and environmental goals.

BMW believes that these objectives are compatible with an appropriate percentage increase if applied equally across all manufacturers.

In order to achieve the third objective, the bill should contain some method of encouraging safety and other environmental goals. While your bill does have a credit concept for certain vehicles to encourage the use of airbags, the restriction of that credit to just a few vehicles does not give adequate incentive. We would ask that you consider expanding such credits to other major safety innovations of undisputed value in order to promote their implementation. These credits and criteria, as well as other, future technologies, should be subject to evaluation by NHTSA to set requirements.

There should also be a program of credits which would promote the implementation of alternative fuel concepts.

We do have great concerns about the penalty program outlined in your bill, particularly as provided in the 93 MY. During this time frame, the impact will clearly be greatest on those companies which cannot average. It would be preferable to have these measures triggered only by a manufacturer's sliding backward and showing reduced fuel economy from year to year. If a manufacturer demonstrates improved fuel economy toward the 1996 requirements, the penalty should remain at $5 per tenth. In this manner your bill could assure earlier improvements in fuel economy.

BMW is confident that with modifications such as outlined above, your bill can achieve your overall objective of improving fuel efficiency of the total fleet.

BMW appreciates the opportunity to comment on this important bill and would ask that these comments be included in the Hearing records.

Thank you for your consideration.

Very truly yours,

Karl H. Gerlinger
President

cc: Honorable Malcolm Wallop
Members of The Senate Energy
and Natural Resources Committee

AMERICAN INTERNATIONAL AUTOMOBILE DEALERS ASSOCIATION
1128 16th Street, N.W., Washington, D.C. 20036
(202) 659-2561

STATEMENT OF THE

AMERICAN INTERNATIONAL AUTOMOBILE DEALERS ASSOCIATION

TO THE U.S. SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

CONCERNING S.341, THE "NATIONAL ENERGY SECURITY ACT OF 1991"

The American International Automobile Dealers Association represents the more than 9,700 franchised new car and truck dealers who market international automobiles in the United States. Our members and their 240,000 employees sell and service imported cars and trucks in the United States, as well as vehicles produced domestically by their international automobile manufacturers. We appreciate this opportunity to address the Committee on our views of S.341, specifically the language pertaining to the "Motor Vehicle Fuel Efficiency Act of 1991" in Title XI of the bill.

S.341 would direct the Secretary of Transportation to adopt new corporate average fuel economy (CAFE) standards. The Secretary would determine the percentage increase in the Model Year (MY) 1990 CAFE necessary to achieve the maximum feasible CAFE for each class of vehicles (e.g., passenger cars, light-duty trucks) for two periods, MYs 1996-2001 and MYs 2002 and beyond. In determining the percentage increase for each class of vehicles, the Secretary would consider various factors, including fuel-saving technology, MY 1990 performance levels, size mix and interior volume, and emission and safety standards. S.341 also contains language pertaining to credit trading, an excessive consumption fee and scrappage programs.

One of the stated intents of S.341 is to reduce U.S. dependence on foreign oil. We believe that this is a laudable goal and that it should be addressed in a manner that is both cost-effective and comprehensive. While we believe that the present CAFE regulatory system is inefficient and easily manipulated, we do not oppose legislation to increase automobile fuel efficiency. We are opposed to the language that directs the Secretary of Transportation to determine the percentage increase for each manufacturer. We believe that such manufacturer-specific language unfairly discriminates against international manufacturers and their dealers.

We believe that S.341 is a significant improvement over the CAFE bills that have been introduced to date in both houses of Congress. We support language that gives authority to the Secretary of Transportation to determine the potential for automobile fuel economy increases, and which directs the Secretary to consider important factors such as fuel-saving technology, emissions and safety standards, etc., in determining those increases. We also support a program to encourage scrappage of older, less fuel-efficient and more polluting vehicles.

We believe the percentage-based CAFE formula in S.341 has several flaws, which we discuss below. However, if the committee deems it necessary to increase CAFE and to enact changes in the current CAFE regulatory system, we would advocate a fuel economy regulatory system based on vehicle size class. In place of the bill's narrowly defined vehicle classes (e.g., passenger vehicle, light-duty trucks), the standards would be based on a uniform percentage increase in the base year average fuel economy for all vehicles in each EPA-defined size class (e.g., compact, subcompact). The size-class approach would provide for much more equitable treatment of manufacturers than the percentage-based approach, yet still apply pressure on manufacturers to increase automobile fuel economy.

I. -- Percentage-based CAFE standards would create a black market in corporate average fuel economy, and a potential franchise nightmare for retail automobile dealers in the U.S.

The current CAFE regulatory system has two standards, one that manufacturers must achieve in their "import" fleet and another that they must achieve in their "domestic" fleet. By establishing manufacturer-specific standards through a percentage-based formula, S.341 would create more than 40 different regulatory standards for the industry -- at least two standards (one for passenger cars and one for light-duty trucks) for each of the approximately 20 manufacturers/importers. In short, a percentage-based CAFE formula would create regulatory chaos. (See the attached excerpt from an *Automotive News* article for examples of how the current CAFE regulatory system creates a "puzzle" for manufacturers, which they must solve to comply with the standards.)

In an effort to meet higher CAFE standards, some manufacturers may choose to merge companies -- in effect merging fuel economy averages. Creative manipulation of the CAFE regulatory system to comply with "corporate average" fuel economy standards would not be new. Ford recently sourced more parts for its large cars (e.g., Crown Victoria) from Mexico to place them in Ford's "import" CAFE category and thereby lower its domestic fuel economy average.

Mergers of automobile companies are likely if manufacturers have difficulty meeting higher CAFE standards. A manufacturer with a low fuel economy average that would otherwise effectively be forced out of the U.S. market by higher CAFE standards would have little choice but to merge with another manufacturer with a higher fuel economy average to remain in the U.S. market. Mergers of this sort would have no positive effect on U.S. automobile fuel economy, but would create a franchising nightmare for dealers of these products.

Dealers are prevented by state franchising laws from owning a franchise within a specified geographic area of another franchisee of the same product. In the event that mergers do occur, a dealer who owns one or the other franchise could find that he or she no longer has the legal right to sell the resulting product in that area -- making his franchise worthless.

To sum, percentage-based standards would lead manufacturers to play more games with the CAFE system. The effect of this manipulation would be no net increase in U.S. automobile fuel efficiency and tremendous losses for retail automobile dealers who have significant, life-long investments in their franchises.

II. The percentage-based standards of S.341 penalize high fuel economy achievement while destroying future incentives.

International automobile manufacturers, as a group, have done the most to develop and successfully market fuel efficient automobiles, having been in the forefront of fuel economy research and development. They have introduced turbochargers and superchargers, to provide additional horsepower for small engines without increasing fuel consumption. And they have developed multi-valve technology, providing improved fuel economy with greater horsepower. Full-line Japanese manufacturers all have CAFE levels in the low 30s, as compared to domestic companies which will barely meet the minimum standard of 27.5 miles per gallon for 1991.

With percentage increases instead of flat, numerical increases in CAFE, this bill penalizes those who have invested the most in fuel economy technology and have subsequently achieved the highest fleet averages, well above that required by the present CAFE standard. It demands the least from the largest segment of the market (domestically-manufactured vehicles comprise approximately 70 percent of the U.S. automobile market), while making disproportionate demands on a relatively small market segment that has led the industry in attaining superior fuel economy standards.

The use of percentage-based CAFE increases clearly sends a message to manufacturers, domestic and international, which is counterproductive to future improvements in fuel economy technology: Exceed the standard and the United States government will make your compliance even more difficult in the future. And this message could spread well beyond just the automotive industry. S.341 could set a precedent for all industries facing the prospect of government regulation. Furthermore, this legislation would have the unintended effect of stifling the creative genius that may some day help solve future pollution and fuel economy problems.

Because of the disproportionate effect that percentage increases in CAFE (versus numerical increases) will have on the various manufacturers, dealers of international automobiles could be restricted to a limited class of vehicles. Japanese and European manufacturers could effectively be forced out of the mid-sized and luxury automobile markets. Potential customers would simply look elsewhere (likely to less fuel-efficient, domestic autos) for vehicles with more power and interior space, defeating the original intent of this legislation. This will unfairly, and without basis, put international automobile dealers at a competitive disadvantage. Some limited-line manufacturers could even be shut out of the U.S. market completely.

III. S.341 would unfairly discriminate against imports and violate GATT.

A percentile CAFE increase would constitute a blatant non-tariff barrier, since it would establish discriminatory and far more stringent fuel economy standards for international vehicles than it would for domestically-produced automobiles.

The major international automobile manufacturers presently maintain higher fuel economy standards by employing most, if not all, available technologies. The opportunity for large improvement in their fuel economies, therefore, is severely limited in comparison to the domestic manufacturers who do not employ all existing technologies. Furthermore, percentage increases would require these manufacturers, who have consistently provided fuel-efficient vehicles, to numerically increase their fuel economies more than the domestic manufacturers.

The proposed percentile increase would violate the international obligations of the United States under the General Agreement on Tariffs and Trade (GATT). Article II (4) of the GATT provides that national treatment should be provided for all requirements affecting the internal sale of products. The percentage-based formula, however, would have the effect of discriminating against international automobiles and would deny national treatment. Furthermore, the Agreement on Technical Barriers to Trade signed by the United States in 1979 requires that the United States not impose standards on technical regulations which have the effect of creating unnecessary obstacles to trade, which the proposed CAFE standard would do. With the percentage-based approach, the CAFE language in S.341 is discriminatory, denies national treatment, and would be import-limiting in effect.

Driving the European and Japanese manufacturers out of the mid-size and luxury car markets would be very expensive for the American consumer and would fuel inflation. Domestic manufacturers, free of price competition in those markets, would predictably raise prices on their mid-size and luxury models. The additional costs to consumers, sure to result from this legislation, could be as great as the expense of the Japanese voluntary restraint agreement, which costs U.S. car buyers as much as $12 billion each year.

IV. Any change in the present CAFE standard MUST BE FAIR TO ALL.

A. Any change in the present CAFE standard must be based upon that standard, not on the individual level of performance that has been achieved by the various manufacturers. Percentage-based CAFE standards penalize the most responsible manufacturers without fulfilling the intent of the legislation. As it stands, the CAFE language in S.341 is fundamentally biased.

B. Congress should not mandate solutions when free market answers are available. The free market has always provided the best solution to market issues (one example is the industry's response to the 1970s oil crisis) and it will continue to do so, if allowed. At the very minimum, manufacturers must be granted the opportunity to use alternative methods other than CAFE to achieve the goals of this legislation.

C. Finally, and very importantly, this legislation must include an exemption for limited-line manufacturers who sell less than 100,000 units annually in the United States. Percentage-based CAFE increases could destroy dealers of those limited lines while having a trivial impact on fuel conservation. At a time when the U.S. is striving to keep European markets open as the European Community (E.C) moves closer to economic integration, such a blatant restriction of the U.S. automotive market would only serve to damage U.S. interests in the E.C. These manufacturers should be given a free-market incentive to produce more fuel-efficient vehicles that are realistically within their manufacturing and marketing capabilities.

* * * * * *

We thank the Subcommittee for this opportunity to express our views on S.341 and look forward to working with the Committee to develop legislation that will responsibly and equitably address the genuine concerns presented by U.S. dependence on foreign oil.

Automotive News.

March 4, 1991

DOUBLE-EDGED SWORD

Japanese transplants being pushed to add more local content, but 'Americanization' of vehicles adds risk of CAFE penalties

By Lindsay Chappell
AUTOMOTIVE NEWS STAFF REPORTER

Japanese transplant automakers are finding the search for North American content is getting harder, despite strong gains last year.

Half of the 16 different cars and trucks currently built at North American transplant factories increased their domestic content levels last year. Of those that did, the average gain was 11.4 percent.

The increase was small comfort for some U.S. parts makers, who say the Japanese are dragging their feet in buying U.S. parts for transplants and for use back in Japan. American critics point out that a gaping $10.5 billion parts-trade imbalance still exists between the two nations.

But while the Japanese scurry to speed up their efforts under intensifying political pressures, they continue to face a double obstacle in their efforts

- U.S. parts makers continue to fall below the quality standards that the Japanese say they are accustomed to, some claim
- By increasing their domestic content above the 75 percent level, some transplants could create, in the eyes of the U.S. government, a new class of vehicles that could throw them into non-compliance with corporate average fuel economy rules

[TEXT]

The CAFE puzzle

CAFE is becoming a stumbling mark to higher North American content as transplant makers approach the 75 percent mark.

New congressional proposals could force automakers to increase their scores by 40 percent within the next decade. That could be bad news for the transplants, who build a number of larger, less fuel-efficient vehicles here, including the Honda Accord sedan and station wagon, the Toyota Camry and the Isuzu Rodeo.

It could also be bad news for American parts makers, since domestic content will determine how those cars are counted by the EPA.

Under CAFE rules, once an entire car or truck model averages 75 percent domestic content — including those units built in Japan — it becomes an automaker's "domestic" fleet. As such, it is not averaged with the cars in the "import" fleet, which tend to have better mileage ratings. Each fleet must meet the EPA's current 27.5-mile-per-gallon standard or face penalties

As the Japanese shift more production to North America and the domestic content levels begin to up some cars out of the import fleets, the transplants could be faced with the challenge of making large gains in fuel-economy ratings or paying the penalty.

CAFE worries have already caused Nissan Motor Co. to slow down its domestic-sourcing push. Officials there said in January that the company will hold its Tennessee-built Sentra below the 75 percent domestic mark to avoid the issue.

Nissan's total fleet averaged 30.8 mpg in 1988, and the Sentra averages safely in the range of 28 to 36 mpg. But a new vehicle the company plans to build in Tennessee starting in 1992 will be based on the Stanza replacement, which averages between 21 and 29 mpg.

Equally problematic, should the Sentra fall out of Nissan's imports, that fleet could find it more difficult to meet rising CAFE requirements — especially if sales of Nissan's big-engine Infiniti line push up the fleet average.

A spokeswoman for Nissan Motor Manufacturing Corp. U.S.A. in Smyrna, Tenn., maintained that "Nissan will continue working to source more componentry from local suppliers" but said the company is studying the CAFE issue closely.

Toyota executives also admit they are unsure where their current U.S. production policy will lead them in CAFE terms. Toyota surprised the industry late last year by

(continued)

(continued from page 1)

announcing it will double production of Camrys in the United States to about 450,000 units a year by the mid-1990s. The company's planned $800-million expansion in Kentucky will mean that all Camrys will be produced domestically. That will happen almost at the same time that aggressive U.S. parts sourcing results in the Camry being re-classified as a domestic product by the EPA.

Because the Camry currently averages in the range of 21 to 27 mpg, the shift could present Toyota with a compliance challenge. To intensify the situation, Toyota also plans to begin building the heavier Camry wagon domestically.

"It's a question we really don't have an answer for yet," said Tim Andree, a spokesman for the carmaker's North American headquarters in New York. "We're obviously not going to stop our sourcing at 74 percent. But we're not sure what the CAFE implications will be for us."

A possible solution may lie in its American production mix. Toyota's co-owned New United Motors Manufacturing Inc. recently announced that the Fremont, Calif.-built Corolla had reached the 75 percent level. A North American Content-Increase Program at NUMMI resulted in the sourcing of 300 new parts numbers from domestic suppliers. (A NUMMI spokesman later modified the statement, stating that "we're now saying that the number is somewhere between 70 and 75 percent.")

Despite the gain, the fuel-efficient Corolla remains classified as an import because the U.S. models are combined with those still imported from Japan. That's beneficial to Toyota, whose import fleet has dropped in overall CAFE efficiency as a result of new Lexus Division sales.

On the other hand, by making the Corolla a domestic product, Toyota could offset the Camry's reclassification, if the two cars are averaged together for one domestic-fleet CAFE rating.

Other transplant vehicles that could face a showdown on the CAFE issue are:

- The Honda Accord — particularly the heavier station wagon version, which will be judged as a separate model for CAFE purposes, according to the EPA. The sedan and coupe version reached the 75 percent domestic level this year, although enough lower-content Accords are still coming in from Japan to keep the model average under the domestic Level. The wagon is produced exclusively in the United States and is expected to reach the 75 percent level during the 1991 model year. The Accord now averages 24 to 26 mpg.
- The Isuzu Rodeo, a sport-utility built exclusively in Lafayette, Ind., with a fuel rating of 16 to 19 mpg this year. The CAFE standard for light trucks is 20.2 mpg.
- The Honda Civic, which is expected to reach the 75 percent level after its 1992 remodeling. Because of the Civic's high fuel efficiency, its potential loss from Honda's import column could knock that fleet down a notch. Or, similar to Toyota's situation with the Camry and Corolla, a domestic Civic could help balance out the domestic Accord.

STATEMENT OF RICHARD I. KILROY, PRESIDENT
TRANSPORTATION TRADES DEPARTMENT, AFL-CIO
ON TITLE XI OF S. 341,
THE NATIONAL ENERGY SECURITY ACT OF 1991
BEFORE THE U.S. SENATE
COMMITTEE ON ENERGY AND NATURAL RESOURCES

February 28, 1991

My name is Richard I. Kilroy. I am the President of the Transportation Trades Department, AFL-CIO (TTD), and appear on its behalf before this Committee. The TTD appreciates this opportunity to present its views concerning Title XI of the National Energy Security Act of 1991 (S. 341), which addresses standards for Corporate Average Fuel Economy (CAFE). The TTD, the newest constitutional department of the AFL-CIO, represents the interests of millions of workers in air, auto, rail, transit, trucking and related industries.

The following labor organizations are members of and represented by the TTD:

Association of Flight Attendants
American Federation of State, County and Municipal Employees
Air Line Pilots Association
American Train Dispatchers Association
Amalgamated Transit Union
Brotherhood of Locomotive Engineers
Brotherhood of Maintenance of Way Employes
Brotherhood of Railroad Signalmen
Communications Workers of America
Hotel Employees and Restaurant Employees Union
International Association of Fire Fighters
International Association of Machinists
International Brotherhood of Boilermakers and Blacksmiths
International Brotherhood of Electrical Workers
International Brotherhood of Firemen and Oilers
International Brotherhood of Teamsters
International Longshoremen's and Warehousemen's Union
International Union of Operating Engineers

National Marine Engineers Beneficial Association
Service Employees International Union
Sheet Metal Workers International Association
Transportation Communications o International Union
Transport Workers Union of North America
International Union of Automobile, Aerospace and Agricultural
    Implement Workers of America
United Steelworkers of America

* * *

As is evident from the above list of TTD affiliates, the Department's policy and legislative priorities cross all modal and industry lines with particular focus on preservations, improvements and expansion of America's transportation network, and preserving and expanding employment opportunities in transportation related industries. The affiliates of TTD are extremely sensitive to the fact that a rational link between U.S. energy and transportation policies is vital to our nation's long-term economic interests--specifically in connection with U.S. reliance on imported oil.

On the issue of CAFE standards, we believe strongly that the United States Congress should constantly reevaluate energy policy in a broad sense, and particularly as it relates to the fuel economy of vehicles sold and operated in the U.S. But we also recognize there is a delicate balance between meeting our long-term energy objectives while still taking into account the importance of American jobs, environmental and safety standards, the automotive industry's financial health, and the price consumers pay for vehicles.

It is particularly important that we review the fuel economy standards adopted some 15 years ago to help solve problems which persist today, such as our country's continuing dependence on imported oil and the problems plaguing the environment. Furthermore, it is critical that we review carefully the manner in which those standards were implemented and complied with by the manufacturers of automobiles.

One point which stands out is that since adoption of CAFE standards, all U.S. automakers have produced domestically enough fuel-efficient cars to meet separate national fuel economy standards, but they continue importing small cars from Japan, South Korea and Mexico to be sold under domestic manufacturers' names. Unfortunately, this practice has resulted in lower employment levels in U.S. small car production than initially anticipated, a fact which concerns us deeply.

U.S. fuel economy laws and standards should be devised to ensure meaningful improvement in fuel efficiency while not creating damaging incentives which encourage the importation of large car production abroad. Our policies must create incentives to maintain domestic production of popular larger cars and to expand American manufacturers' production of small cars as well. Furthermore, it is imperative that we find ways to achieve our objectives without threatening the competitive position of U.S. full-line producers and the security of their workers.

Title XI of S. 341 addresses many critically important issues concerning fuel economy standards. The TTD supports those provisions which would make it mandatory for all manufacturers (domestic and foreign) to achieve improved fuel economy standards by an equal percentage relative to the fleetwide fuel economy of the base year model. This approach would ensure that all full-line producers, regardless of their production commitment to high performance vehicles, would be on an even playing field insofar as meeting fleetwide CAFE standards.

In any effort to improve fuel economy it is important that safety and emissions standards remain top priorities, and that they be allowed to co-exist peacefully with other objectives such as fuel conservation. None of these concerns should be set aside to achieve the other.

Another issue presented by S. 341 involves technical innovation. It is our position that CAFE standards should not exceed the realistic capabilities of automotive technology; and, just as important, that we should avoid embracing new technologies with an unrealistic expectation that immediate improved fuel efficiencies and associated environmental benefits will be realized with the mere introduction of such innovations into the marketplace. We need a rational plan that balances immediate energy efficiency needs with technological capability and market application.

Consideration of new technologies' short and long-term effects upon fuel efficiency standards requires that we fully analyze certain critical issues. First, many years of lead time is necessary to plan and create, design, engineer, test and eventually manufacture new models. This fact must receive serious consideration when establishing CAFE standards for 1996 and 2002.

Second, it is apparent that the much needed lead time for vehicle production changes would make it difficult for automakers to operate in 1996 under new fuel economy standards established in July 1992, as much of the planning and preparation for the mid-1990s is already well underway. Setting CAFE standards for the year 2002, however, is a more realistic approach, as it allows significantly more lead time for development and application of technological improvements.

Third, it is unrealistic to conclude that the consumer will benefit from adoption of standards that in theory are intended to improve fuel economy standards, but in reality lead directly to additional financial hardship for the nation's major car makers at a time of deep recession and slumping sales. And, given the American automakers' limitations at this time due to severe financial losses in 1990, it is also highly implausible they will have the means to achieve overly ambitious fuel economy goals without forcing consumers to pay exorbitant prices for new technological introductions. The by-product of this will be better fuel efficiency on paper, perhaps, but in reality there will be a competitive disadvantage for newly introduced models that help meet new fleetwide fuel efficiency standards but fail significantly to penetrate the marketplace.

Finally, we cannot overstate our deep concern with job loss in the automotive and related industries. The members of our affiliates not only make the cars -- they ship them via rails, trucks and waterways; they work for steel producers and other suppliers; and they work for hundreds of companies whose existence depends upon a vibrant domestic automotive industry. Clearly, fuel economy gains must be balanced by consideration of job dislocation as well as by economic feasibility. The ranks of the unemployed, particularly in manufacturing -- which was once America's great strength and could be again -- are growing nationwide. Thus, we believe the nation would be ill served by a fuel economy standard that sets goals without first considering and weighing heavily its net effect on the economy and employment levels.

Another issue of concern is the possible elimination of the current requirement that each manufacturer adhere to separate fuel economy standards for its foreign and domestic fleets. We submit that elimination of this requirement would effectively wipe out the incentive for domestic car producers to continue making small cars in the U.S. Not only is it imperative that our domestic industry maintain a good balance of small and large cars, we must avoid policies that create a disincentive to continue U.S. production of any size vehicle.

We are suffering from the importation of certain types of cars manufactured abroad. If improved fuel conservation is the dominant trend on the international automotive landscape, then we must do everything possible to protect America's economic interests in that growing sector of the marketplace. Our economy and our work force both would benefit.

The TTD realizes there are myriad concerns surrounding the issue of CAFE standards. S. 341 sets out to accomplish a great deal in the area of fuel economy and energy efficiency at a time when our nation's energy needs are still overly dependent upon imported oil.

We believe strongly in the need for a rational energy policy that demands maximum attainable energy efficiency at all levels. In that regard, we stress the need to research and develop alternative fuels as future sources of power. Prior to enactment of this legislation, however, it is important that we weigh carefully the effect new standards would have on the U.S. economy and jobs at a time of recession, financial hemorrhage in the auto industry and ineffective trade policies by the present Administration.

The TTD and its affiliates thank the Committee for the opportunity to address this critical energy policy issue. We look forward to future opportunities to express the views of transportation labor.

Statement on S.341, the National Energy Security Act of 1991, Submitted to the Senate Committee on Energy and Natural Resources

February 28, 1991

INSURANCE
INSTITUTE
FOR
HIGHWAY
SAFETY

1005 N. GLEBE ROAD, ARLINGTON, VA 22201 (703) 247-1500

The Insurance Institute for Highway Safety is a nonprofit research and communications organization, supported by the nation's property and casualty insurers, that identifies ways to reduce motor vehicle crashes and crash losses. At this Committee's request, the Institute is providing research results on the relationship between vehicle safety and fuel economy standards. Also as requested, the Institute is addressing questions from the Committee about the safety consequences of proposed fuel economy standards and providing information about several safety issues that have been raised during the current fuel economy debate.

Institute research shows very clearly that downsizing cars has negative safety consequences. If fuel economy standards are set at a level that forces auto manufacturers to make cars smaller, the occupants of such cars would be exposed to greater risk of death or injury on our nation's highways. The current debate should focus on reasonable fuel economy improvements that can be achieved without reducing vehicle size.

Any legislation addressing fuel economy should require the Secretary of Transportation to analyze the safety consequences including downsizing, changing the vehicle mix, etc. Such analyses should also address the adverse safety effects that could follow from automakers using new engine technologies to increase vehicle performance rather than to increase fuel efficiency.

Response to question 6(a), which asks respondents to comment on the safety assumption in proposed section 502(e)(2)(E).

Section 502(e)(2)(E) of the National Energy Security Act of 1991 provides that, in determining the maximum feasible average fuel economy, the Secretary of Transportation must assume that vehicles will meet "all applicable automobile safety standards." This provision is related to the requirement that the Secretary must consider the "effect of other Federal motor vehicle standards on fuel economy" (section 502 (e)(1)(C)).

These two provisions are far too narrow. They require the Secretary only to consider the specific added vehicle weights associated with specific federal motor vehicle safety standards -- fine as far as it goes, but it does not go far enough. The Secretary should look beyond this to assess the overall safety effects tougher fuel economy standards

Insurance Institute for Highway Safety
1005 N. Glebe Road, Arlington, VA 22201
February 1991

might have. In particular, the Secretary should consider whether the standards would result in either downsized cars or more small cars being sold in order to comply with the tougher standards. By requiring a safety impact analysis, Congress would ensure that safety is not overlooked in the fuel economy decisionmaking process.

Response to question 6(b): Are smaller automobiles less safe than larger automobiles? Why or why not? Have studies of this question adequately controlled for other correlating factors affecting safety?

Studies by the U.S. Department of Transportation, the Insurance Institute for Highway Safety, and other safety research organizations have consistently found that car size is perhaps the most important single factor when it comes to protecting occupants in crashes. All other things being equal, people in larger cars sustain fewer injuries in crashes than people in smaller cars. This occurs because smaller cars have less crush space outside the occupant compartment to absorb energy and, therefore, higher crash forces are transmitted to their occupants. Less crush space also means the occupant compartments of smaller cars are more vulnerable to intrusion in crashes than are the compartments of larger cars. When occupant compartments are intruded, the likelihood of serious injury increases dramatically regardless of the restraint system.

Overall, the death rate in the smallest cars on the road is more than double the rate in the largest cars. For every 10,000 registered cars 1-3 years old in 1989, 3.0 deaths occurred in the smallest cars, compared with 1.3 in the largest cars. The death rate is at least twice as high in small cars, compared with large cars, in both single- and multiple-vehicle crashes. These effects of car size hold regardless of driver age.

The Institute has examined in detail the safety effects of vehicle downsizing. Institute researchers have looked at occupant death rates for 11 General Motors car types that were downsized during the late 1970s and '80s, finding occupant death rates higher for 10 of the 11 types after downsizing. The rate for the eleventh type remained the same (see Status Report, Vol. 25, No. 8, attached). The number of deaths per 10,000 registered Chevrolet Camaros and Firebirds, for example, jumped 43 percent from before to after downsizing in 1982. Deaths per 10,000 registered Buick LeSabres and Oldsmobile Delta 88s increased 27 percent after downsizing in 1986. What is clear from these and other comparisons is that downsized models have more occupant deaths per registered car than their larger counterpart models.

At February 1991 hearings before the Consumer Subcommittee of the Senate Committee on Commerce, Science, and Transportation, Marc Ledbetter of the American Council for An Energy Efficient Economy challenged the Institute's conclusions about occupant death rates before and after downsizing. He noted that downsized cars are newer than their larger predecessor models and that, on average, newer cars travel more miles than older ones. The Institute has completed additional analyses to clarify these results and found offsetting effects. Newer cars do travel more miles, on average, than older ones, and so there is greater exposure to crash involvement in newer cars. As cars age, the risk of being in a crash decreases. On the other hand, safety belt use is higher in new cars than it is in older cars. This means lower risk of crash death or injury in newer cars, compared with older ones.

No reliable data are available to adjust for these offsetting effects. Besides, it is not necessary to do so. Occupant death rates for General Motors cars that were not downsized provide ideal comparison groups for those that were downsized because, in each group, vehicle age-related effects should have the same influence. Institute researchers have computed death rates for comparison (i.e., not downsized) General Motors car types and found that, in five out of eight cases, such rates did not change or they actually decreased (see attached table, "Deaths Per 10,000 Registered Cars in Calendar Years 1985-89, GM Models Before and After Downsizing"). In the three cases where death rates did increase for newer but unchanged (i.e., not downsized) cars, the increases were smaller than those for the downsized cars. Such results confirm the Institute's earlier finding that downsizing leads to increased occupant death rates.

Another way to understand the impact of downsizing on car safety is to compare the occupant death rate for a recent model year with the rate that would have been expected in the absence of downsizing. Institute researchers have calculated both the actual occupant death rate for 1988 model year cars in 1989 and the rate that would have been expected if the mix of '88 cars by size had been the same as in the 1975 model year. The actual occupant death rate was 2.2 per 10,000 registered 1-year-old passenger cars in 1989. However, if we had more large cars and fewer small ones -- as we did in the 1975 model year, before downsizing -- the death rate for the '88 models would have been much lower, 1.8 per 10,000 instead of 2.2. This means there were about 425 extra deaths in 1988 models during 1989, simply because the cars were smaller, on average, than the 1975 models. These are excess deaths in only one model year of cars during one calendar year. Additional deaths will occur each year in the 1988 models, as well as in other downsized cars, for as long as these cars are on the road.

Car Size (Wheelbase in inches)	PASSENGER CAR SIZE DISTRIBUTION 1975 Models Registered in Calendar Year 1976	 1988 Models Registered in Calendar Year 1989	Occupant Deaths Per 10,000 Registered 1988 Model Cars During Calendar Year 1989
<95 in.	6%	13%	3.4
95-99 in.	19%	19%	2.5
100-04 in.	3%	36%	2.1
105-09 in.	6%	18%	1.6
110-14 in.	23%	10%	1.8
>114 in.	42%	4%	1.2

OVERALL OCCUPANT DEATH RATE FOR 1988 MODELS IN '89 = 2.2

EXPECTED DEATH RATE GIVEN 1975 MODEL YEAR SIZE MIX = 1.8

Response to question 6(c): Are higher-performance automobiles less safe than lower-performance automobiles? Why or why not? Have studies of this question adequately controlled for other correlating factors affecting safety?

A study by the Insurance Institute for Highway Safety computed deaths per 10,000 registered 1985-87 cars during 1986-88 and found that, among the 103 biggest-selling vehicle series, the rates varied by more than 700 percent (see Status Report, Vol. 24, No. 11, attached). The influence of car size is clear -- 12 of the 15 cars with the highest death rates were small, the other three were midsize, and none were large.

Equally clear are the effects of vehicle performance on death rates -- several high-performance cars had especially poor fatality rates. In fact, the automobile series with the highest death rate per 10,000 registered cars was the Chevrolet Corvette, a small high-performance car. Other such cars including the Nissan 300ZX, Chevrolet Camaro, and Pontiac Firebird also were among those with highest death rates.

Because death rates are influenced by vehicle size and the age and sex of drivers, Institute researchers computed for each of the 103 cars series a predicted as well as an actual death rate. The predicted rate is the one that would be expected based on the size of the car and the age and sex of the driver. What researchers found were several high-performance cars with actual death rates far worse than their predicted rates. For example, the Corvette's rate was 44 percent worse than predicted. It is reasonable to assume that some of this increased risk is due to the car's performance characteristics.

The Institute is concerned that many automakers have implemented engine technology improvements largely to boost performance instead of to improve fuel economy. This is particularly unfortunate because high performance works against both fuel economy and safety. Automakers should not only stop building cars with excessively high performance but also promoting performance in ways that encourage excessive speeding.

Speed promotion has been blatant in recent years. For example, according to an article in Automotive News, "...hot rodding is back at Pontiac. Firebird customers with the 225-horsepower 5.0 liter V-8 or the 240-horsepower 5.7 liter V-8 engines will be able to ask dealers to increase performance with the Street Legal Performance package" that adds extra horsepower. Advertisements such as the one attached for Toyota, which extols the 0-60 mph capability of its MR2 Turbo sports car, are proliferating, too.

While Congress is working to try to find ways to save fuel and decrease our dependence on foreign oil, automakers are working against the same goal by marketing high-performance options that use more fuel and compromise safety by increasing acceleration and top speed capabilities. Cars from Detroit, Europe, and Japan with very fast 0-60 mph acceleration times and very high top speeds have nothing to do with everyday driving. Now is the time to change auto design and marketing practices to enhance both safety and fuel conservation. Now is the time, for example, to consider controls on the acceleration and top speed capabilities of passenger cars. Current technology allows for top speed controls at, say, 70 mph while allowing adequate acceleration for normal driving as well as reserve acceleration for rare emergencies. Rethinking auto design in ways like this could serve both safety and fuel conservation.

Response to question 6(d): Do safety standards provide for an adequate level of safety regardless of the size of the automobile? Compare the effect on safety of vehicle size to the effects of other variables such as age, performance level of automobiles, intoxication, conformity to speed limits, etc.

Federal motor vehicle safety standards have the important effect of setting minimum levels of safety performance that vehicles sold in the United States must meet. Complying with these standards does not, however, overcome the laws of physics that dictate the safety disadvantage of small vehicle size.

In multiple-vehicle crashes, the disadvantages to the occupants of smaller cars are obvious and, in fact, are dictated by the laws of physics. But it is not only in multiple-vehicle crashes that occupants of small cars face greater risks. Even in single-vehicle crashes, which accounted for 44 percent of all passenger car occupant deaths in 1989, the occupant death rate in the smallest cars was 1.2 per 10,000 registered 1-3 year old cars in 1989, compared with 0.5 per 10,000 in the largest cars.

For the next several model years, the relative safety disadvantage to occupants of small cars will get worse. This is because mostly large and midsize cars, not small ones, will be equipped with advanced safety features like air bags.

Response to question 6(e): As a matter of national policy, should Congress contemplate changes in CAFE law that trade off smaller size for greater fuel savings? Assume, for purposes of this question, that size is related to safety.

The Insurance Institute for Highway Safety understands the importance of conserving fuel not only to lessen our dependence on unstable foreign oil sources but also to protect the environment. We support all sensible steps to conserve fuel, including improved fuel economy, that do not result in smaller cars. At the same time, safety must be a factor in fuel economy and environmental decisions that involve automobiles, and the research data are clear and convincing on this point -- smaller cars have higher death rates than larger cars. Congress should not enact fuel economy requirements that would lead to smaller, less safe cars.

The Research Safety Vehicle (RSV)

One issue that is not being correctly addressed in the current fuel economy debate involves occupant safety in the federal government's RSV program. Of specific concern is the performance of the Minicars RSV.

Contrary to a number of claims, the Minicars RSV is not particularly fuel efficient. Its fuel economy rating that would be used in corporate average fuel economy calculations is 33 miles per gallon. Furthermore, the Minicars RSV is not a family-size vehicle. It does have an outer body comparable in size to that of the Chrysler New Yorker, but the interior is little bigger than a sports car. Its seating capacity is basically 2+2, and the rear seat is not big enough to accommodate a child safety seat.

The RSV does demonstrate some important safety concepts including air bag protection in high-speed frontal crashes. But there are tradeoffs. Its side impact protection, for example, includes features such as thick foam-filled gullwing doors with windows that cannot be rolled down and a very high side floor sill. These features are not likely to be acceptable in cars sold to the general public. Handling characteristics of the RSV are also poor and, in fact, were rated as unsafe when it was tested in Germany in 1980.

Fuel Economy Standards and Vehicle Death Rate per Miles Traveled

During the current fuel economy debate, some people continue to point to the per-mile motor vehicle death rate, saying that because this rate is lower than it has ever been present fuel economy standards could not have imposed adverse safety effects. This is a specious claim, however, because the overall motor vehicle death rate is too general a statistic to gauge anything as specific as the impact of car downsizing. Many factors have contributed to an overall improvement in the highway safety picture since fuel economy standards were introduced and cars were downsized. Most states have enacted safety belt use laws, for example, and more people are buckling up. We, as a society, are taking alcohol-impaired driving more seriously than we used to. This major problem has been addressed with tougher laws and enforcement programs. Plus, baby boomers have grown up, so there are fewer young, high-risk drivers on our streets and highways. These and other changes more than offset the negatives associated with smaller cars, which is why the per-mile death rate is going down.

Another, very specific reason this rate is going down is that it includes all kinds of deaths -- motorcyclist, bicyclist, pedestrian, and other categories of deaths that have nothing to do with car size. The decline in the mileage death rate during recent years is largely due to declines in these other deaths, particularly motorcyclist deaths, which are down 25 percent since 1983.

What Fuel Economy Improvement can be Achieved without Reducing Car Size? Automotive engineers at the Insurance Institute for Highway Safety are in the process of examining the 1990 passenger car fleet to determine what fuel economy improvements can be made without having to reduce vehicle size. In doing so, the 1990 fleet will be arranged into size categories based on wheelbase.

Why wheelbase instead of interior volume, which is reported to the Environmental Protection Agency? Because it is the exterior dimensions of cars, rather than their interior volumes, that are relevant to safety. Exterior size is what determines whether there is sufficient crush zone to protect occupants in crashes. It is possible for a vehicle to have substantial interior volume but very limited exterior dimensions. Such a car would have little structure to absorb crash force before it causes occupant compartment intrusion.

Results of the Institute's analyses of potential improvement in fuel economy for the 1990 fleet will be submitted to the Committee when they are complete.

Deaths per 10,000 Registered Cars in Calendar Years 1985-1989
GM Models Before and After Downsizing

	Car Type Downsized	Before Downsizing		After Downsizing		Percent Change in Rate
		Model Years	Death Rate	Model Years	Death Rate	
1.	B Car	1975-76	1.2	1977-78	1.4	+ 17
2.	C/D Car	1975-76	1.1	1977-78	1.2	+ 9
	All other GM	1975-76	2.2	1977-78	2.2	0
3.	A/G Car	1976-77	1.7	1978-79	1.8	+ 6
	All other GM	1976-77	2.5	1978-79	2.6	+ 4
4.	E Car	1977-78	0.9	1979-80	1.1	+ 22
	All other GM	1977-78	1.9	1979-80	1.8	- 5
5.	X Car	1978-79	1.9	1980-81	2.2	+ 16
	All other GM	1978-79	1.9	1980-81	1.7	- 11
6.	A Car	1980-81	1.5	1982-83	1.5	0
7.	F Car	1980-81	2.3	1982-83	3.3	+ 43
	All other GM	1980-81	1.8	1982-83	1.7	- 6
8.	Y Car	1981-82	3.9	1984*	4.4	+ 13
	All other GM	1981-82	1.7	1983-84	1.7	0
9.	C/D Car	1983-84	1.0	1985-86	1.3	+ 30
	All other GM	1983-84	1.9	1985-86	2.0	+ 5
10.	B/H Car	1984-85	1.1	1986-87	1.4	+ 27
11.	E Car	1984-85	0.9	1986-87	1.5	+ 67
	All other GM	1984-85	2.1	1986-87	2.3	+ 10

Results for downsized cars are in bold type.

1. 1975-76 compared with 1977-78 model Chev. Impala, Caprice; Pont. Catalina, Bonneville, Gr. Safari, Grandville; Buick LeSabre; and Olds Delta 88

2. 1975-76 compared with 1977-78 model Buick Electra; Cadillac Calais, DeVille, Fleetwood Brougham; and Olds 98

3. 1976-77 compared with 1978-79 model Chev. Malibu, Chevelle, Monte Carlo; Pont. LeMans, Gr. Prix, Gr. Am; Buick Century, Regal; and Olds Cutlass

4. 1977-78 compared with 1979-80 model Cadillac Eldorado and Olds Toronado

5. 1978-79 compared with 1980-81 model Chev. Nova, Citation; Pont. Phoenix; Buick Skylark; and Olds Omega

6. 1980-81 Chev. Malibu; Pont. LeMans, Grand Am; Buick Century; and Olds Cutlass (exc. Supreme, Calais) compared with 1982-83 model Chev. Celebrity, Pont. 6000, Buick Century, and Olds Cutlass Ciera

7. 1980-81 compared with 1982-83 model Chev. Camaro and Pont. Firebird

8. 1981-82 compared with 1984 model Chev. Corvette.
*Downsized Corvettes were introduced early in calendar year 1983 and called 1984 models.

9. 1983-84 rear-wheel-drive Buick Electra, Olds 98 (exc. wagon) and Cadillac Deville, Fleetwood (exc. limo) compared with front-wheel-drive 1985-86 models

10. 1984-85 compared with 1986-87 model Buick LeSabre and Olds Delta 88 (exc. wagon)

11. 1984-85 compared with 1986-87 model Buick Riviera, Cadillac Eldorado, and Olds Toronado

Note: N Cars (Buick Somerset/Skylark, Pont. Gr. Am, Olds Calais) aren't included because downsized 2-door models were introduced in 1985, 4-door in 1986

STATUS INSURANCE INSTITUTE FOR HIGHWAY SAFETY REPORT

November [illegible]

Death Rates Vary Among Cars by More Than 700 Percent

Occupant deaths occur far more often in some cars than in others. Insurance Institute for Highway Safety researchers [illegible] the death rates for 1985-87 cars [illegible] among the 103 biggest-selling [illegible] series, the one with the [illegible] Volvo four-door [illegible] car with [illegible] per 10,000 of [illegible] registered. The series with the highest death rate, [illegible], is the Chevrolet Corvette, a small sports car whose [illegible] death rate is more than eight times as high as the [illegible] (see pages 4-5).

For each [illegible] series, rates were computed from the total number of occupant deaths and registrations that occurred in the three calendar years 1986-88. [illegible] series is a family of cars [illegible] that has the same wheelbase and [illegible] degree of commonality in construction such as body, chassis, etc.) Results for individual 1985-87 series are presented only for those with at least 150,000 registrations during 1986-88. (1988 models aren't included because registrations are counted midyear when new cars are still being sold.) Results for all cars and for each car size/body style group were computed from death and registration counts for all vehicle series, regardless of the numbers registered.

Car size is an important influencing

(See 700% Variation, p. 2)

During 1986-88 [illegible] than 75,000 occupants of passeng[illegible] died in highway crashes. What kind[illegible]rs were they traveling in? Do some ca[illegible] higher death rates than others? And [illegible] how much higher? How does car size [illegible] death rates? What else affects these r[illegible]

This special St[illegible]port focuses exclusively on death ra[illegible] on-the-road crashes — not crash test r[illegible]r insurance claims data for injuries. [illegible]able on pages 4-5 shows occupant d[illegible]r 10,000 registered cars by make and [illegible] arranged according to size and body st[illegible]

Many Cars Performing Better (or Worse) Than Predicted

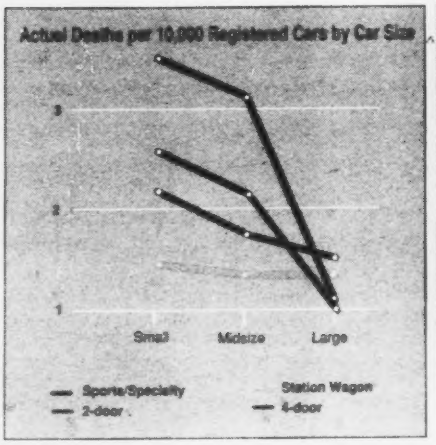
Actual death rates for individual car series tell only part of the story (see Death Rates Vary Among Cars by More Than 700 Percent) because they're influenced by the age and sex of the people who drive them, as well as by the size of the cars. So Insurance Institute for Highway Safety researchers computed for each of 103 popular car series a predicted as well as an actual death rate, with the predicted rate taking into account the three important factors influencing the actual death rate. The researchers developed a regression model relating actual death rates to car size, driver age, and driver sex. Because vehicle registration information cannot be broken down by age and sex, the researchers' model uses information about the drivers in the fatal crashes.

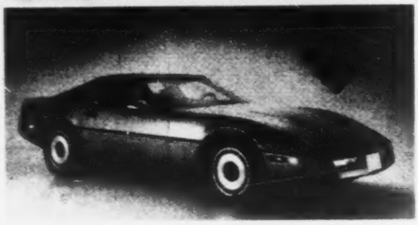
Specifically, the researchers estimated a nonlinear relationship between the death rates of individual vehicle series and their wheelbases, proportion of occupant deaths that occurred with drivers under 25 years old, and proportion of male drivers. (A detailed explanation of the research methods is available from the Institute on request.)

From this model, the researchers computed a predicted death rate for each car series using its actual wheelbase, proportion of young drivers, and proportion of male drivers. Then the researchers com-

(See Better or Worse, p. 3)

SPECIAL ISSUE: OCCUPANT DEATH RATES BY CAR SERIES





700% Variation

(Continued from page 1)

[illegible] death rates (Table 1). [illegible] cars along with the overall [illegible] rates [illegible] are large [illegible] midsize cars [illegible] The other three [illegible] are large.

Large four-door cars are the size/body style group with the lowest deaths per 10,000 registered cars. The next best group is large four-door cars followed by large and midsize station wagons. The group with the highest number of deaths per 10,000 registered cars is small sports/specialty cars.

Death rates vary not only by car size but also within size and body style groups. Among small four-door cars, for example, the Volkswagen Jetta has the lowest death rate (1.1). The rate for the small four-door Chevrolet Chevette, another small car, is nearly four times as high (4.1).

The mix of occupant deaths between single- and multiple-vehicle crashes varies considerably, too, with small cars usually having a higher proportion of their deaths in single-vehicle crashes, compared to large cars. Chevrolet's Corvette has the highest proportion of single-vehicle crash deaths (83 percent) among all 103 car series, and Oldsmobile's Cutlass Ciera station wagon has the lowest (13 percent).

Another important influence on death rates, besides car size, is driver age. Cars with high percentages of fatal crashes involving drivers who are under 30 years old tend to have higher death rates. The sex of the driver is important too: cars with high percentages of male drivers tend to have higher death rates (see Table on pages 6-7).

These three factors — car size and driver age and sex — explain some of the differences in death rates among cars. But they don't explain them all. The Honda Prelude, for example, has a relatively low death rate (1.7), even though it's small and has a relatively high percentage of drivers under 30 (47 percent). Its percentage of male drivers is about average (60 percent).

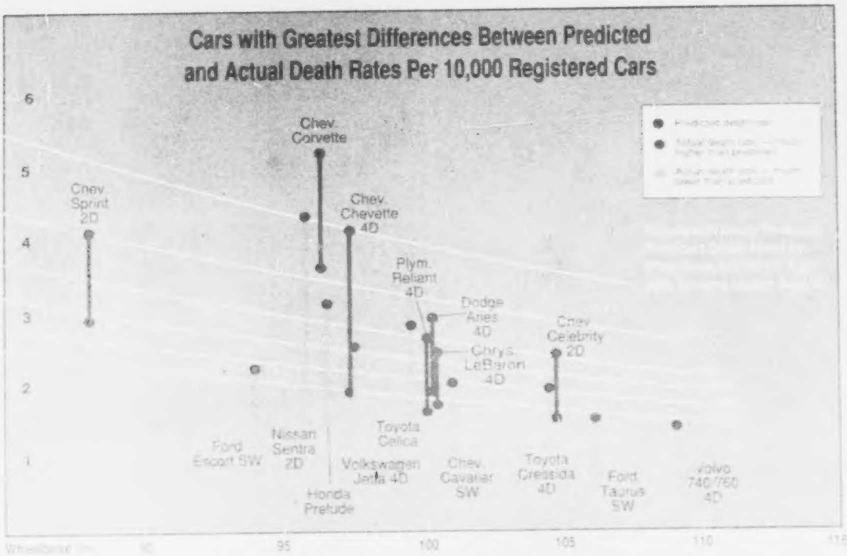
To account for the effects of car size and driver age and sex on death rates, Institute researchers used a regression model with these three variables to compute a predicted death rate for each car series. Then they compared predicted and actual rates (see Many Cars Performing Better (or Worse) Than Predicted, page 1).

Lowest Death Rates

Volvo 740/760 4-door (0.6)
Ford Taurus station wagon (0.7)
Lincoln Town Car (0.8)
Audi 5000 4-door (1.1)
Cadillac Fleetwood/DeVille 4-door (1.1)
Cadillac Fleetwood/DeVille 2-door (1.1)
Chevrolet Cavalier station wagon (1.1)
Olds Cutlass Ciera station wagon (1.1)
Toyota Cressida 4-door (1.1)
Volkswagen Jetta 4-door (1.1)

Highest Death Rates

- **Chevrolet Corvette (5.2)**
- **Chevrolet Camaro (4.9)**
- **Dodge Charger/Shelby (4.5)**
- **Ford Mustang (4.4)**
- **Nissan 300ZX (4.2)**
- **Chevrolet Chevette 4-door (4.1)**
- **Chevrolet Sprint 2-door (4.1)**
- **Honda Civic CRX (3.9)**
- **Pontiac Firebird (3.8)**
- **Plymouth Turismo (3.6)**
- **Pontiac Fiero (3.5)**
- **Chevrolet Chevette 2-door (3.4)**
- **Chevrolet Spectrum 4-door (3.2)**
- **Dodge Daytona 2-door (3.1)**
- **Ford Escort 2-door (3.0)**



Better or Worse

[illegible] death rates [illegible] cars among 103 [illegible] [illegible] were computed [illegible] performed better than predicted [illegible] Thirty-nine performed worse. Six cars have actual and expected death rates that match their predicted rates.

What's especially interesting are the differences that Institute researchers found between cars' predicted and actual death rates. This comparison tells us how much better or worse each of the cars is performing than we would expect, given the car's size and the age and sex of the drivers

The subcompact Nissan Sentra's (above) actual occupant death rate [illegible] percent lower than Institute researchers predicted from its wheelbase and drivers' age and sex — best among all 103 car series. The four-door Chevrolet Chevette's (below) actual rate is 135 percent higher than predicted — by far the worst.

who are in [illegible] [illegible] the following cars [illegible] better than predicted after taking car size and the age and sex of drivers into account: Nissan Sentra two-door, Volvo 740/760 four-door, Volkswagen Jetta four-door, Ford Taurus station wagon, Honda Prelude, Chevrolet Cavalier station wagon, Ford Escort station wagon, Toyota Celica, and Toyota Cressida four-door.

The following seven cars perform far worse than predicted: Chevrolet Chevette four-door, Plymouth Reliant four-door, Chevrolet Celebrity two-door, Dodge Aries four-door, Chevrolet Corvette, Chrysler LeBaron four-door, and Chevrolet Sprint two-door.

Actual and Predicted Deaths per 10,000 Registered Passenger Cars,

			Actual Rate	Predicted Rate	Actual Diff. from Predicted Better	Worse
STATION WAGONS & VANS LARGE	All		1.3	1.5		
	85-87	Plymouth Voyager	1.2	1.4	14%	
	85-87	Chevrolet Caprice	1.4	1.7	18%	
	85-87	Dodge Caravan	1.4	1.3		8%
	86-87	Ford Aerostar	1.5	1.2		25%
	85-87	Chevrolet Astro Van	2.0	2.1	5%	
MIDSIZE	All		1.3	1.7		
	85-87	Ford Taurus	0.7	1.5	53%	
	85-87	Oldsmobile Cutlass Ciera	1.1	1.5	27%	
	85-87	Chevrolet Cavalier	1.1	2.0	45%	
	85-87	Chevrolet Celebrity	1.3	1.7	24%	
	85-87	Plymouth Reliant	2.0	1.6		25%
SMALL	All		1.4	1.9		
	85-87	Subaru DL/GL 4WD	1.2	2.0	40%	
	86-87	Ford Escort[1]	1.2	2.2	45%	
	85-87	Subaru DL/GL	1.4	1.7	18%	
FOUR DOOR CARS LARGE	All		1.5	1.4		
	85-87	Mercury Grand Marquis	1.2	1.5	20%	
	85-87	Buick Electra	1.3	1.4	7%	
	85-87	Ford Crown Victoria	1.4	1.6	[illegible]	
	85-87	Chrysler New Yorker 5th Ave	1.5	1.2		25%
	86-87	Oldsmobile Delta 88[1]	1.5	1.3		15%
	85-87	Oldsmobile Ninety Eight	1.5	1.5		
	85-87	Chevrolet Caprice/Impala	1.6	1.4		14%
	86-87	Buick LeSabre[1]	1.8	1.4		29%
MIDSIZE	All		1.7	1.7		
	85-87	Toyota Cressida	1.1	1.9	42%	
	85-87	Buick Century	1.2	1.6	25%	
	85-87	Volvo 240	1.2	1.9	37%	
	86-87	Pontiac Grand Am[1]	1.2	[illegible]	[illegible]	
	85-87	Oldsmobile Cutlass Ciera	1.2	[illegible]	13%	
	85-87	Chrysler LeBaron GTS	1.3	[illegible]	24%	
	86-87	Mercury Sable	1.3	2.0	35%	
	85-87	Pontiac 6000	1.3	[illegible]	34%	
	86-87	Ford Taurus	1.4	2.0	30%	
	86-87	Oldsmobile Calais[1]	1.4	1.5	[illegible]	
	86-87	Honda Accord[1]	1.5	1.7	[illegible]	
	85-87	Mercury Topaz[1]	1.6	2.0	20%	
	85-87	Oldsmobile Cutlass	1.6	1.3		23%
	85-87	Chrysler New Yorker	1.6	1.6		
	85-87	Plymouth Caravelle	1.7	1.4		21%
	85-87	Chevrolet Celebrity	1.7	1.6		6%
	85-87	Ford Tempo[1]	1.8	1.8		
	85-87	Dodge Lancer	1.9	2.0	5%	
	85-87	Nissan Maxima[1]	2.0	2.5	20%	
	85-87	Chevrolet Cavalier	2.3	1.9		21%
	85-87	Dodge 600	2.3	1.8		28%
	85-87	Chrysler LeBaron	2.4	1.7		41%
	85-87	Pontiac Sunbird	2.5	1.8		39%
	85-87	Plymouth Reliant	2.6	1.6		63%
	85-87	Dodge Aries	2.9	1.9		53%
SMALL	All		2.1	2.2		
	85-87	Volkswagen Jetta[1]	1.1	2.5	56%	
	85-87	Mazda 626[1]	1.5	2.0	25%	
	85-87	Toyota Corolla	1.6	2.3	30%	
	85-87	Honda Civic	1.7	2.6	35%	
	86-87	Ford Escort[2]	1.8	2.7	33%	
	85-87	Chevrolet Nova	2.0	2.1	5%	
	85-87	Volkswagen Golf[2]	2.0	2.5	20%	
	85-87	Subaru DL/GL Sedan	2.0	1.8		11%
	85-87	Dodge Omni	2.3	2.1		10%
	85-87	Renault Alliance Encore	2.5	1.9		32%
	86-87	Hyundai Excel[3]	2.6	2.6		
	85-87	Plymouth Horizon	2.8	2.1		33%
	85-87	Chevrolet Spectrum	3.2	2.5		28%
	85-87	Chevrolet Chevette	4.1	1.9		116%

1985–87 Models During 1986–88, by Car Size and Body Style

TWO DOOR CARS

			Actual Rate	Predicted Rate	Actual Diff. from Predicted	
					Better	Worse
LARGE	All		**1.0**	**1.3**		
MIDSIZE	All		**2.1**	**2.2**		
	85-87	Pontiac Grand Prix	1.2	1.7	29%	
	85-87	Oldsmobile Cutlass Ciera	1.2	1.8	33%	
	86-87	Honda Accord[3]	1.4	1.8	22%	
	85-87	Oldsmobile Cutlass	1.5	1.7	12%	
	85-87	Buick Somerset[3]	1.5	2.2	32%	
	86-87	Buick Skyhawk	1.9	2.2	14%	
	85-87	Oldsmobile Calais[3]	1.9	1.9		
	85-87	Ford Tempo	2.0	2.6	23%	
	85-87	Buick Regal	2.0	1.9		5%
	85-87	Pontiac Grand Am[3]	2.1	2.8	25%	
	85-87	Ford Thunderbird	2.3	2.5	8%	
	85-87	Chevrolet Celebrity	2.4	1.5		60%
	85-87	Mercury Cougar	2.4	2.2		9%
	85-87	Chevrolet Cavalier	2.7	2.6		4%
	85-87	Chevrolet Monte Carlo	2.8	2.1		33%
	85-87	Pontiac Sunbird	2.8	2.4		17%
SMALL	All		**2.6**	**2.9**		
	87	Nissan Sentra	1.5	4.3	65%	
	85-87	Honda Prelude	1.5	3.1	52%	
	86-87	Toyota Celica	1.6	2.8	43%	
	85-87	Honda Civic	2.3	2.8	18%	
	85-87	Toyota Corolla	2.5	3.8	34%	
	85-87	Nissan 200SX	2.5	3.3	24%	
	85-87	Renault Alliance/Encore[1]	2.6	2.5		4%
	86-87	Ford Escort[2]	3.0	2.9		3%
	85-87	Dodge Daytona[2]	3.1	3.2	3%	
	85-87	Chevrolet Chevette	3.4	2.5		36%
	85-87	Plymouth Turismo	3.6	2.6		38%
	85-87	Chevrolet Sprint	4.1	2.9		41%
	85-87	Dodge Charger Shelby	4.5	3.3		36%

SPORTS & SPECIALTY CARS

			Actual Rate	Predicted Rate	Actual Diff. from Predicted	
					Better	Worse
LARGE	All		**1.1**	**1.2**		
	85-87	Lincoln Town Car	0.8	1.2	33%	
	85-87	Cadillac Fl'wood/Deville 4D	1.1	1.2	8%	
	85-87	Cadillac Fl'wood/Deville 2D	1.1	1.4	21%	
	85-87	Cadillac Brougham 4D	1.4	1.2		17%
MIDSIZE	All		**3.1**	**3.1**		
	85-87	Volvo 740/760 4D[4]	0.6	1.4	57%	
	85-87	Audi 5000 4D	1.1	1.7	35%	
	85-87	BMW 3-Series 2D	2.6	3.4	24%	
	85-87	Pontiac Firebird	3.8	3.1		23%
	85-87	Ford Mustang	4.4	3.7		19%
	85-87	Chevrolet Camaro	4.9	3.8		29%
SMALL	All		**3.5**	**3.9**		
	85-87	Pontiac Fiero	3.6	3.8	5%	
	85-87	Honda Civic CRX	3.9	5.3	26%	
	85-87	Nissan 300ZX	4.2	4.2		
	85-87	Chevrolet Corvette	5.2	3.6		44%

Average for All Cars	**2.0**

NOTES

Note 1 — all 1985-87 models equipped with automatic safety belts

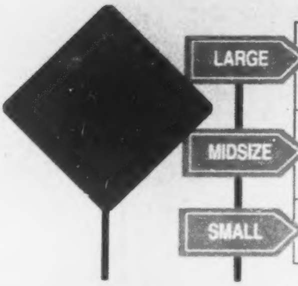
Note 2 — some 1985-87 models equipped with automatic safety belts

Note 3 — some 1987 models equipped with automatic safety belts

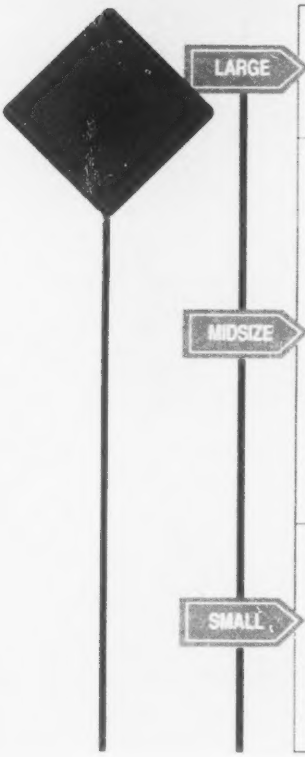
Note 4 — some 1987 models equipped with air bags

Note 5 — small number of 1986-87 models equipped with air bags

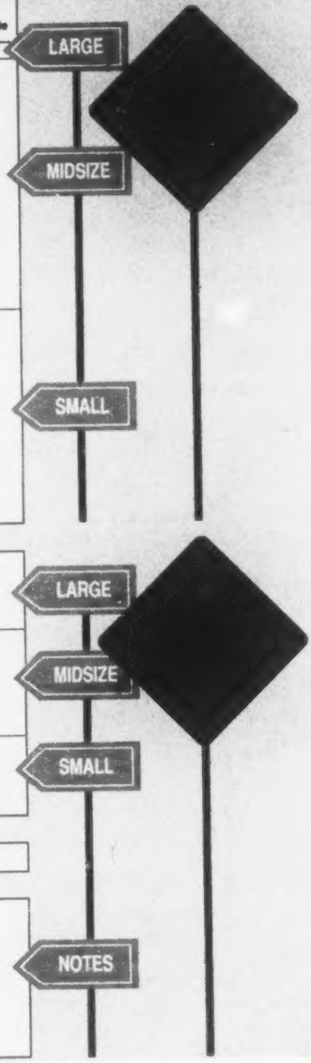
Additional Information About Cars Listed on Pages 4 and 5



		Wheelbase	Registration Counts	Percent Young	Percent Male	Percent Single-Vehicle
All		113	2171626	8	72	38
85-87	Plymouth Voyager	112	424297	10	60	42
85-87	Chevrolet Caprice	116	267961	5	83	51
85-87	Dodge Caravan	112	441432	8	60	28
86-87	Ford Aerostar	119	245795	3	70	47
85-87	Chevrolet Astro Van	111	237391	10	85	38
All		103	2422393	11	59	28
86-87	Ford Taurus	106	192635	8	62	38
85-87	Oldsmobile Cutlass Ciera	105	206594	9	54	13
85-87	Chevrolet Cavalier	101	333760	30	48	24
85-87	Chevrolet Celebrity	105	474547	8	66	38
85-87	Plymouth Reliant	100	158117	10	45	25
All		95	1398753	15	51	27
85-87	Subaru DL/GL 4WD	97	297623	22	53	41
86-87	Ford Escort	94	216394	11	66	26
85-87	Subaru DL/GL	97	202208	7	50	21



All		112	5332746	7	67	29
85-87	Mercury Grand Marquis	114	659335	1	77	28
85-87	Buick Electra	111	654103	7	63	30
85-87	Ford Crown Victoria	114	649393	9	77	36
85-87	Chrysler New Yorker 5th Ave	113	578406	6	50	21
86-87	Oldsmobile Delta 88	111	504992	4	58	29
85-87	Oldsmobile Ninety Eight	111	725090	11	64	33
85-87	Chevrolet Caprice Impala	116	973987	7	74	25
86-87	Buick LeSabre	111	260169	2	67	33
All		103	14259931	15	57	30
85-87	Toyota Cressida	105	226634	20	66	32
85-87	Buick Century	105	1165207	10	59	19
85-87	Volvo 240	104	194789	4	78	46
86-87	Pontiac Grand Am	103	236689	17	66	41
85-87	Oldsmobile Cutlass Ciera	105	1416518	12	61	31
85-87	Chrysler LeBaron GTS	103	354826	17	51	41
86-87	Mercury Sable	106	204337	15	76	33
85-87	Pontiac 6000	105	858217	14	62	26
86-87	Ford Taurus	106	572652	13	75	32
86-87	Oldsmobile Calais	103	152219	9	73	18
86-87	Honda Accord	102	711315	19	56	37
85-87	Mercury Topaz	100	324770	25	56	36
85-87	Oldsmobile Cutlass	108	351615	[illegible]	55	24
85-87	Chrysler New Yorker	103	543965	6	59	25
85-87	Plymouth Caravelle	103	222030	10	38	21
85-87	Chevrolet Celebrity	105	1511862	11	56	24
85-87	Ford Tempo	100	1136992	13	56	35
85-87	Dodge Lancer	103	257199	26	58	40
85-87	Nissan Maxima	100	504610	30	69	41
85-87	Chevrolet Cavalier	101	949226	26	50	30
85-87	Dodge 600	103	154630	11	64	32
85-87	Chrysler LeBaron	100	280464	6	61	22
85-87	Pontiac Sunbird	101	246549	31	48	18
85-87	Plymouth Reliant	100	421025	4	56	26
85-87	Dodge Aries	100	377880	10	66	27
All		96	6311723	27	54	35
85-87	Volkswagen Jetta	97	426048	33	61	48
85-87	Mazda 626	99	385282	12	53	39
85-87	Toyota Corolla	96	721365	11	54	32
85-87	Honda Civic	97	400643	34	63	24
86-87	Ford Escort	94	307159	26	70	41
85-87	Chevrolet Nova	96	501419	25	45	37
85-87	Volkswagen Golf	97	171413	14	77	29
85-87	Subaru DL/GL Sedan	97	244519	15	52	47
85-87	Dodge Omni	99	393067	27	56	35
85-87	Renault Alliance Encore	98	259941	19	55	15
86-87	Hyundai Excel	94	359094	33	62	45
85-87	Plymouth Horizon	99	462250	29	53	27
85-87	Chevrolet Spectrum	95	257252	37	48	31
85-87	Chevrolet Chevette	97	235068	21	46	31



		Wheelbase	**Registration Counts**	**Percent Young**	**Percent Male**	**Percent Single-Vehicle**
All		**112**	**385820**	**8**	**60**	**24**
All		**104**	**8211293**	**32**	**62**	**46**
85-87	Pontiac Grand Prix	108	265340	29	52	48
85-87	Oldsmobile Cutlass Ciera	105	216330	15	68	22
86-87	Honda Accord	102	183179	20	57	44
85-87	Oldsmobile Cutlass	108	849302	18	63	45
85-87	Buick Somerset	103	410854	33	60	46
85-87	Buick Skyhawk	101	256783	38	50	40
85-87	Oldsmobile Calais	103	500293	28	50	33
85-87	Ford Tempo	100	360532	32	71	45
85-87	Buick Regal	108	574254	26	65	54
85-87	Pontiac Grand Am	103	614476	42	68	45
85-87	Ford Thunderbird	104	836119	33	71	51
85-87	Chevrolet Celebrity	105	156198	16	46	38
85-87	Mercury Cougar	104	676456	30	65	48
85-87	Chevrolet Cavalier	101	796638	45	52	42
85-87	Chevrolet Monte Carlo	108	615309	32	67	51
85-87	Pontiac Sunbird	101	284260	38	56	58
All		**96**	**6029296**	**42**	**57**	**48**
87	Nissan Sentra	96	219194	59	63	50
85-87	Honda Prelude	97	417450	47	60	40
86-87	Toyota Celica	99	291992	46	52	46
85-87	Honda Civic	94	341379	37	60	40
85-87	Toyota Corolla	95	234437	53	63	51
85-87	Nissan 200SX	96	281220	41	70	57
85-87	Renault Alliance/Encore	98	247267	42	45	27
86-87	Ford Escort	94	601516	40	58	51
85-87	Dodge Daytona	97	248330	44	66	61
85-87	Chevrolet Chevette	94	228112	35	52	35
85-87	Plymouth Turismo	97	246854	44	44	44
85-87	Chevrolet Sprint	88	179729	30	60	22
85-87	Dodge Charger/Shelby	97	264532	48	63	57

All		**114**	**2280617**	**4**	**61**	**32**
85-87	Lincoln Town Car	117	628888	6	66	26
85-87	Cadillac F'lwood/Deville 4D	111	797011	2	50	26
85-87	Cadillac F'lwood/Deville 2D	111	222238	8	61	33
85-87	Cadillac Brougham 4D	122	299773	2	73	22
All		**103**	**4188458**	**42**	**76**	**62**
85-87	Volvo 740/760 4D	109	240544	7	62	53
85-87	Audi 5000 4D	106	236559	15	84	56
85-87	BMW 3-Series 2D	101	198049	38	82	66
85-87	Pontiac Firebird	101	505787	41	75	63
85-87	Ford Mustang	101	816331	50	75	59
85-87	Chevrolet Camaro	101	923385	47	79	68
All		**92**	**1984292**	**43**	**74**	**61**
85-87	Pontiac Fiero	93	378815	48	68	47
85-87	Honda Civic CRX	87	332406	60	64	48
85-87	Nissan 300ZX	91	264497	41	79	69
85-87	Chevrolet Corvette	96	167869	30	85	83

Average for All Cars	**103**	**54978352**	**27**	**62**	**41**

Wheelbase — length in inches

Registration Counts — sum of vehicles registered in each calendar year

Percent Young — percent of deaths in cars with drivers under age 30

Percent Male — percent of deaths in cars with male drivers

Percent Single-Vehicle — percent of deaths in single-vehicle crashes

Special Issue

Vol. 24, No. 11, November 25, 1989

This special issue of *Status Report* focuses on death rates by car make and model. Other special issues have focused on the following subjects:

Designing Safer Vehicles	24:8, 1989
Truck Crash Congestion	23:12, 1988
Making Traffic Laws Work	23:6, 1988
Seat Belt and Helmet Laws	22:13, 1987
NHTSA: Safety Rules	22:9, 1987
Vehicle Size and Death Rates	22:2, 1987
U.S. Safety Acts	21:11, 1986
Seat Belt Use Laws	20:12, 1985
School Bus Safety	20:5, 1985
Seat Belt Use Laws	19:14, 1984
Teenagers' Driving	19:10, 1984
The Injury Fact Book	19:7, 1984
Automatic Restraints	18:18, 1983
Truck Crashes	18:4, 1983
Small Car Hazards	17:20, 1982
Drunk Driving	17:18, 1982

STATUS INSURANCE INSTITUTE FOR HIGHWAY SAFETY REPORT

1005 North Glebe Road
Arlington, VA 22201
(703) 247-1500

Editor: James H. Mooney
Associate Editor: Rea Tyler
Writers: Sharon Rasmussen, Karen Steiner
Editorial Assistants: Carlene Hughes, Loretta Morrison
Production: Sheila Jackson

The Insurance Institute for Highway Safety is an independent, nonprofit, scientific and educational organization. It is dedicated to reducing the losses — deaths, injuries and property damage — resulting from crashes on the nation's highways. The Institute is supported by the American Insurance Highway Safety Association, the American Insurers Highway Safety Alliance, the National Association of Independent Insurers Safety Association and several individual insurance companies.

Contents may be republished whole, or in part, with attribution.

ISSN 0018-988X

STATUS INSURANCE INSTITUTE FOR HIGHWAY SAFETY REPORT

Vol. 25, No. 8 September 8, 1990

Where Is Safety in the Fuel Economy Debate?

The Energy Policy and Conservation Act of 1975 required passenger car manufacturers to achieve fleet-average fuel economy of 27.5 mpg by the 1985 model year. In response to this requirement as well as consumer demand, automakers succeeded in nearly doubling average fuel economy between the mid 1970s and 1984.

Now that American and other troops are defending Middle East oil fields, national attention is being refocused on oil conservation. Saving fuel would not only lessen our need for foreign oil but also cut the carbon dioxide emissions that contribute to global warming. One long-term conservation plan now before Congress could raise average auto fuel economy to 40 mpg by 2001.

Some proponents of tougher fuel economy standards say they're practical to achieve using existing technology without shifting to much smaller cars. Automakers say substantial new fuel economy gains will be hard to come by and definitely will require another round of downsizing.

Largely missing from this debate is safety. Downsizing cars has negative safety consequences. This is not to say fuel economy standards should be abandoned. It is to say their potential to increase crash deaths and injuries should be considered in the debate.

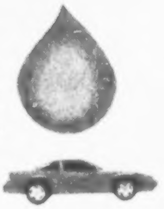
Congress Looking at Fuel Economy Changes

Automobiles on U.S. roads are much more fuel efficient now than 15 years ago, but improvements aren't continuing apace. The fuel economy of the U.S. fleet decreased 4 percent from 1988 to 1990 due in great part to a 6 percent overall gain in car weight and a 10 percent increase in average engine horsepower.

To spur renewed emphasis on fuel economy in the long run — federal standards cannot alleviate immediate gasoline shortages — Senator Richard H. Bryan of Nevada introduced the Motor Vehicle Fuel Efficiency Act in 1989. This legislation would require each automaker to achieve a 20 percent increase in the fuel economy of its passenger cars by the 1995 model year — 40 percent by 2001 — compared with 1988. If these improvements are realized, the U.S. fleet would be getting an

(Cont'd on p. 5)

Downsizing Cars Means More Deaths



Fuel economy standards create safety problems if they force automakers to make cars smaller in order to increase the average miles per gallon of their fleets.

Ford and General Motors were building mostly large and midsize cars before fuel economy standards were implemented in the 1970s. They are the two largest automakers that have since downsized their cars. Chrysler has stopped making large cars altogether. Meanwhile, many Japanese cars have actually increased in size.

The effects of these changes on safety have been dramatic. In the 1979 model year, the average wheelbase of Toyotas and Nissans was 15 inches shorter than the wheelbases of domestic Ford and GM cars — and the occupant death rate in the

Deaths Per 10,000 Registered Cars, GM Models Before and After Downsizing, 1985-89

Car Type	Model Yr. Down-sized	Death Rate Before Downsizing	Death Rate After Downsizing	Percent Change in Rate
1. B Car	1977	1.2	1.4	+17
2. C/D Car	1977	1.1	1.2	+9
3. A/G Car	1978	1.7	1.8	+6
4. E Car	1979	0.9	1.1	+22
5. X Car	1980	1.9	2.2	+16
6. A Car	1982	1.5	1.5	0
7. F Car	1982	2.3	3.3	+43
8. Y Car	1984	3.9	4.4	+13
9. C/D Car	1985	1.0	1.3	+30
10. B/H Car	1986	1.1	1.4	+27
11. E Car	1986	0.9	1.5	+67

1. 1975-76 compared with 1977-78 model Chev. Impala, Caprice; Pont. Catalina, Bonneville, Gr. Safari, Grandville; Buick LeSabre; and Olds Delta 88

2. 1975-76 compared with 1977-78 model Buick Electra; Cadillac Calais, DeVille, Fleetwood Brougham; and Olds 98

3. 1973-77 compared with 1978-79 model Chev. Malibu, Chevelle, Monte Carlo; Pont. LeMans, Gr. Prix, Gr. Am; Buick Century, Regal; and Olds Cutlass

4. 1977-78 compared with 1979-81 model Cadillac Eldorado and Olds Toronado

5. 1978-79 compared with 1980-81 model Chev. Nova, Citation; Pont. Phoenix; Buick Skylark; and Olds Omega

6. 1980-81 Chev. Malibu; Pont. LeMans, Grand Am; Buick Century; and Olds Cutlass (exc. Supreme, Calais) compared with 1982-83 model Chev. Celebrity, Pont. 6000, Buick Century, and Olds Cutlass Ciera

7. 1980-81 compared with 1982-83 model Chev. Camaro and Pont. Firebird

8. 1981-82 compared with 1984 model Chev. Corvette

9. 1983-84 rear-wheel-drive Buick Electra, Olds 98 (exc. wagon) and Cadillac Deville, Fleetwood (exc. limo) compared with front-wheel-drive 1985-86 models

10. 1984-85 compared with 1986-87 model Buick LeSabre and Olds Delta 88 (exc. wagon)

11. 1984-85 compared with 1986-87 model Buick Riviera, Cadillac Eldorado, and Olds Toronado

Note: N Cars (Buick Somerset/Skylark, Pont. Gr. Am, Olds Calais) aren't included because downsized 2-door models were introduced in 1985, 4-door in 1986

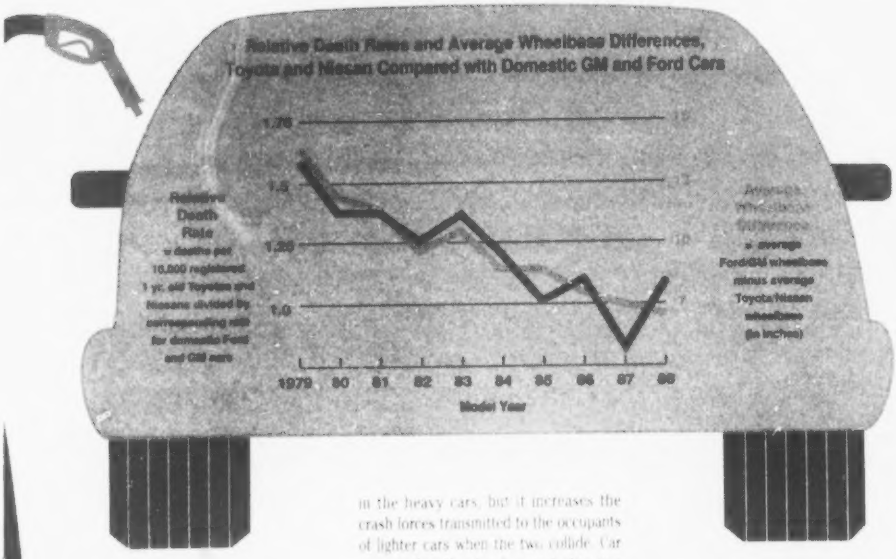
Japanese cars was 56 percent higher. In subsequent years, as the wheelbases of the Japanese cars lengthened and those of domestic Ford and General Motors cars got shorter, the death rates in these cars got much closer (see graph, page 3).

Insurance Institute for Highway Safety researchers have also looked at death rates for 11 GM car types downsized since 1977. What they found were higher occupant death rates for 10 of the 11 types after downsizing. The rate for the other type stayed the same (see table, left).

The death rate for 1980-81 model F-cars (Chevrolet Camaros and Pontiac Firebirds), for example, was 2.3 per 10,000 registered cars during 1985-89. After downsizing, the rate for 1982-83 Camaros and Firebirds jumped to 3.3 per 10,000 — a 43 percent increase. The death rate for Buick LeSabres and Oldsmobile Delta 88s increased 27 percent from before to after downsizing in 1986.

What's clear from these and other comparisons is that newer and smaller General Motors models have more occupant deaths per registered car — 23 percent more deaths, on average — than their earlier and larger counterparts.

Previous research has come to similar conclusions about the effects of downsizing. A study by researchers at Harvard University and the Brookings Institution reported that the average weight of new cars began declining in the 1970s and that 1985 and later models are an average of 500 pounds lighter than they would have been without fuel economy standards. This reduction in weight is associated with a 14 to 27 percent increase in occupant fatality risk, the researchers estimated. They further projected a total of 17,800 deaths during the life of 1989 model cars. Without fuel economy standards, they said, the fatality toll would be much



smaller, 13,900 to 15,600." "Fuel economy standards are "estimated to be responsible for 2,200 to 3,900 excess occupant fatalities over 10 years of a given model year's use," the researchers concluded.

A 1989 U.S. Department of Transportation report has pointed to an increase in fatal single-vehicle rollover crashes as an adverse safety effect of downsizing. "Narrower, lighter, shorter cars have higher rollover rates than wide, heavy, long ones under the same crash conditions. During 1970-82, as the market shifted from large domestic cars to downsized, subcompact or imported cars, the fleet became more rollover prone." The net effect of all the car size changes that have been made since 1970, the Transportation Department concluded, "is an increase of approximately 1,340 rollover fatalities each year."

So both car size and weight influence occupant safety. But weight has tradeoffs in terms of safety — it protects the people in the heavy cars, but it increases the crash forces transmitted to the occupants of lighter cars when the two collide. Car size, on the other hand, is protective in a crash without imposing penalties on the occupants of other cars.

This is important because weight has more effect than size on fuel economy, so removing weight without substantially affecting size benefits both safety and fuel economy. Many such weight reduction measures are already in place (see Technology to Meet Tougher Fuel Economy Requirements, page 6). But there's a point at which reducing car weight, in practical terms, also involves reducing car size. This is because, for example, the materials to build lighter cars without downsizing may be prohibitively expensive.

Even after a decade of downsizing and steady improvement in the fuel efficiency of Ford and General Motors cars, neither automaker is expected to meet the 1990 fuel economy standard of 27.5 miles per gallon without using credits earned in prior years. Some luxury imports don't meet the standard, either, but the resulting penalty on these relatively expensive cars is considered little more than a luxury tax.

Japanese automakers were importing mostly small cars into the United States when fuel economy standards were implemented in the 1970s. These cars easily met the federal standards — they still do — so no downsizing has been necessary. In fact, Japanese car manufacturers have for years been earning credits under fuel economy standards, allowing them to build and market larger, more powerful, less fuel efficient cars. Honda is a good example. Its cars have always met federal standards, but their average fuel economy has been declining in recent years.

Because tougher fuel economy requirements would call for each automaker to significantly improve its fleet-average fuel use, it's likely that many manufacturers will have to downsize in order to comply. This is the point at which improving fuel economy will pose a safety problem.

Bigger Is Safer But Costs Fuel

Car size is perhaps the most important single factor when it comes to protecting occupants in crashes. All other things being equal, people in larger cars sustain fewer injuries in crashes than people in smaller cars. Why? Because the smaller cars have less crush space to absorb energy and, therefore, higher crash forces are transmitted to their occupants.

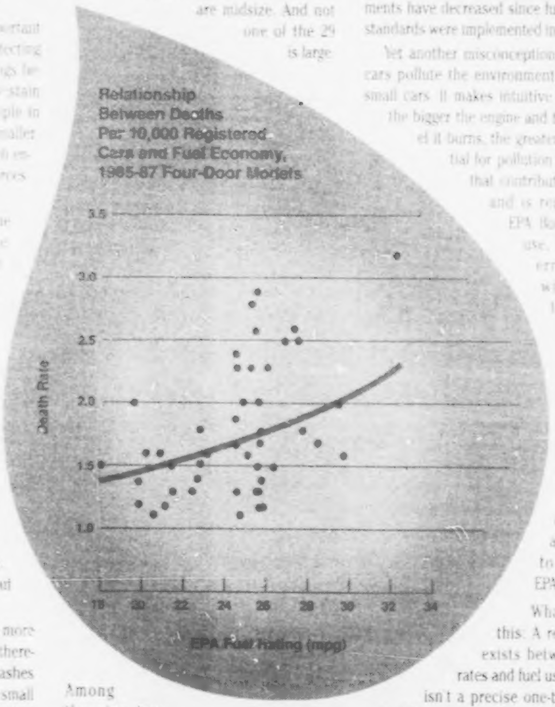
In crashes involving at most one car being towed away from the scene, a greater percentage of the occupants of small cars are killed, compared with larger cars.

Overall, the death rate in the smallest cars on the road is more than double the rate in the largest cars. For every 10,000 registered cars one to three years old in 1989, 3.0 deaths occurred in the smallest cars on the road, compared with 1.3 in the largest cars. The death rate is at least twice as high in small cars, compared with large cars, in both single- and multiple-vehicle crashes. The effects of car size are true without regard to the ages of the drivers.

Some people claim small cars are more maneuverable than large ones and, therefore, less likely to be involved in crashes in the first place. It's true that some small cars may be more maneuverable, but they're not less likely to be in crashes. The best evidence of this comes from recent insurance claims data for crash damage. The frequency of such claims for small two-door cars is 35 percent higher (worse) than for large two-door cars.

The same differences hold for four-door cars, so there's no evidence to support assertions that small cars are involved in fewer crashes than large cars. The evidence points in the other direction.

Insurance claims for occupant injuries are also more frequent in small cars than in large ones. Among the 29 two- and four-door cars with the highest frequencies of injury claims, 27 are small. Two are midsize. And not one of the 29 is large.


Relationship Between Deaths Per 10,000 Registered Cars and Fuel Economy, 1985-87 Four-Door Models

Among the nine two- and four-door cars with the lowest injury claim frequencies, on the other hand, seven are large. The other two are midsize, and not one of the nine is small.

Another misconception is that, because cars' interior volumes haven't changed much since fuel economy standards were implemented, cars haven't gotten any smaller or less safe since these standards. Such arguments are based on the Environmental Protection Agency's (EPA) definition of car size based on interior volume — a measurement that has little or nothing to do with safety. Wheelbase and overall car length are size dimensions that affect safety, and both of these exterior measurements have decreased since fuel economy standards were implemented in the 1970s.

Yet another misconception is that big cars pollute the environment more than small cars. It makes intuitive sense that the bigger the engine and the more fuel it burns, the greater the potential for pollution — the kind that contributes to smog and is regulated by EPA. But, in normal use, large modern engines with pollution control technology don't pollute any more than smaller ones. In fact, automobiles of all sizes are subject to the same EPA standards.

What's true is this: A relationship exists between death rates and fuel use, even if it isn't a precise one-to-one relationship (see graph, this page). According to a regression equation estimated by Institute researchers from the death rates and EPA fuel ratings of 47 four-door cars, on average every one mile-per-gallon improvement in fuel economy translates into a 3.9 percent increase in the death rate.

Congress Looking at Fuel Economy Changes

(Cont'd from p. 1)

average 34 miles per gallon by 1995, 40 miles per gallon by the 2001 model year.

The Bryan proposal is different from present fuel economy requirements, which set a single standard (27.5 miles per gallon) for all automakers. Under the proposed requirements, every manufacturer, even those now meeting the 27.5 mpg standard, would have to improve fleet fuel economy by specified percentages.

Like current fuel economy standards, Senator Bryan's proposal is less stringent for pickup trucks, vans, and utility vehicles — which account for about a third of all new passenger vehicle sales — than it is for cars.

Like current standards, too, the Bryan proposal wouldn't simply average the miles per gallon of an automaker's models in order to arrive at a fleet average. Instead, the standard would be based on how many gallons of fuel it takes for a given manufacturer's fleet of cars to go a specified distance. Called a "harmonic average," this way of measuring fuel economy has an important practical effect — it means that a disproportionate number of high-mileage cars have to be sold to offset low-mileage cars. If one car has a 40 mpg fuel rating and another gets 20 mpg, for example, it would take three gallons of gas for both cars to travel 40 miles. But the fleet average would be 26.7 miles per gallon (80 miles traveled divided by 3) instead of the simple average of 30 mpg.

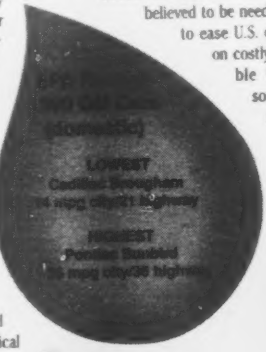
In one of the few acknowledgments so far that fuel economy standards pose safety implications, Senator Jack Danforth of Missouri got an amendment added to Bryan's proposal before it was reported out of the Committee on Commerce, Science, and Transportation. (See *Status Report*, Vol. 25, No. 6, June 30, 1990.) This amendment would encourage air bags in smaller cars — an important addition because most of the cars that are scheduled to be equipped with air bags during the next few model years are large and midsize. Without air bags, occupants of small cars will be at an even greater safety disadvantage, compared with people who travel in larger cars.

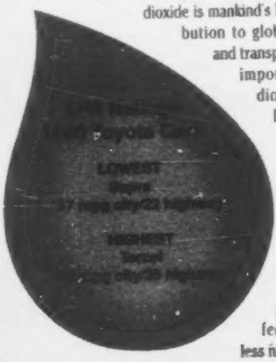
U.S. Department of Transportation staff have calculated that the fuel economy proposals now being debated in Congress would save 49 billion gallons of fuel between 1995 and 2001. Fuel saving is believed to be needed not only to ease U.S. dependence on costly and unstable foreign oil sources but also for environmental reasons — in particular, to slow global warming, which is also known as "the greenhouse effect."

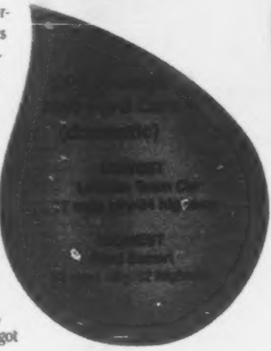
The greenhouse effect involves certain gases in the earth's atmosphere, especially carbon dioxide, trapping the sun's radiation and thus raising overall temperatures. According to the United Nation's Intergovernmental Panel on Climate Change, the average global temperature will be 4° to 9° F higher in 2070 than it was in the preindustrial period. The rate of increase in the global mean temperature will be greater in the next 30 years than during the past 10,000 years, the panel reported.

Predictions like these are based on climate models that are far from perfect, so there's disagreement on the exact pace of global warming. However, scientists generally do agree that the earth is getting warmer and that the results could include disasters like icecap surges and floods, droughts in other areas, invasions of insects, and extinctions.

What does all this have to do with the fuel economy of automobiles? Carbon dioxide is mankind's largest contribution to global warming, and transportation is an important carbon dioxide source. Emissions of carbon dioxide are directly proportional to amounts of fuel used, so one way to slow the greenhouse effect is to burn less fuel in our cars.







Some improvements in automobile fuel economy can be accomplished — without downsizing and thus compromising safety — by making engine and/or transmission technology changes. Many such changes have already been made. They just haven't been made on all new cars.

The estimated benefits of these energy-saving technologies have been repeatedly quantified, added, and presented to policymakers during recent Congressional hearings. Such estimates are subjective, though, so it's not surprising that there's such wide variation among them.

Now Insurance Institute for Highway Safety engineers have analyzed the benefits associated with various fuel economy strategies. For example:

- **Reducing car weight** by 10 percent, the most direct way to cut fuel consumption, can provide an estimated 5 percent improvement in fuel economy. Most automobile weight reductions of the past decade have involved downsizing. Weight has also been saved by switching from steel to materials of lighter weight like aluminum and plastic. However, lightweight materials for building automobiles often are more expensive — sometimes far more expensive — than steel. In practical terms, it may be difficult to realize much further weight saving without additional downsizing of cars.

- **Reducing aerodynamic drag** by 10 percent can provide an estimated 2 percent improvement in fuel economy because, as drag lessens, the amount of power needed to move a car through the air also lessens. The benefits of aerodynamic styling aren't really apparent at low speeds, but the extra power required to go 60 mph instead of 50, for example, is great enough that such styling can make a noticeable difference.

The problem is, major aerodynamic changes — the kind that can increase fuel economy markedly — might involve radical changes to current car design. Truly aerodynamic autos might be too low, too small, etc. for car buyers to accept.

In addition to studying general strategies like reducing weight and drag, Institute engineers have drawn the following conclusions about benefits associated with specific fuel economy technologies:

- **Adding extra valves** (intake and exhaust) per cylinder can provide an estimated 5 percent improvement in fuel economy by making it easier and more efficient for engines to take in fuel and air and discharge exhaust. This means engines can be made smaller, and thus more fuel efficient, without reducing performance. A small four-valve-per-cylinder engine, for example, can achieve the same horsepower as a conventional two-valve-per-cylinder engine that's larger.

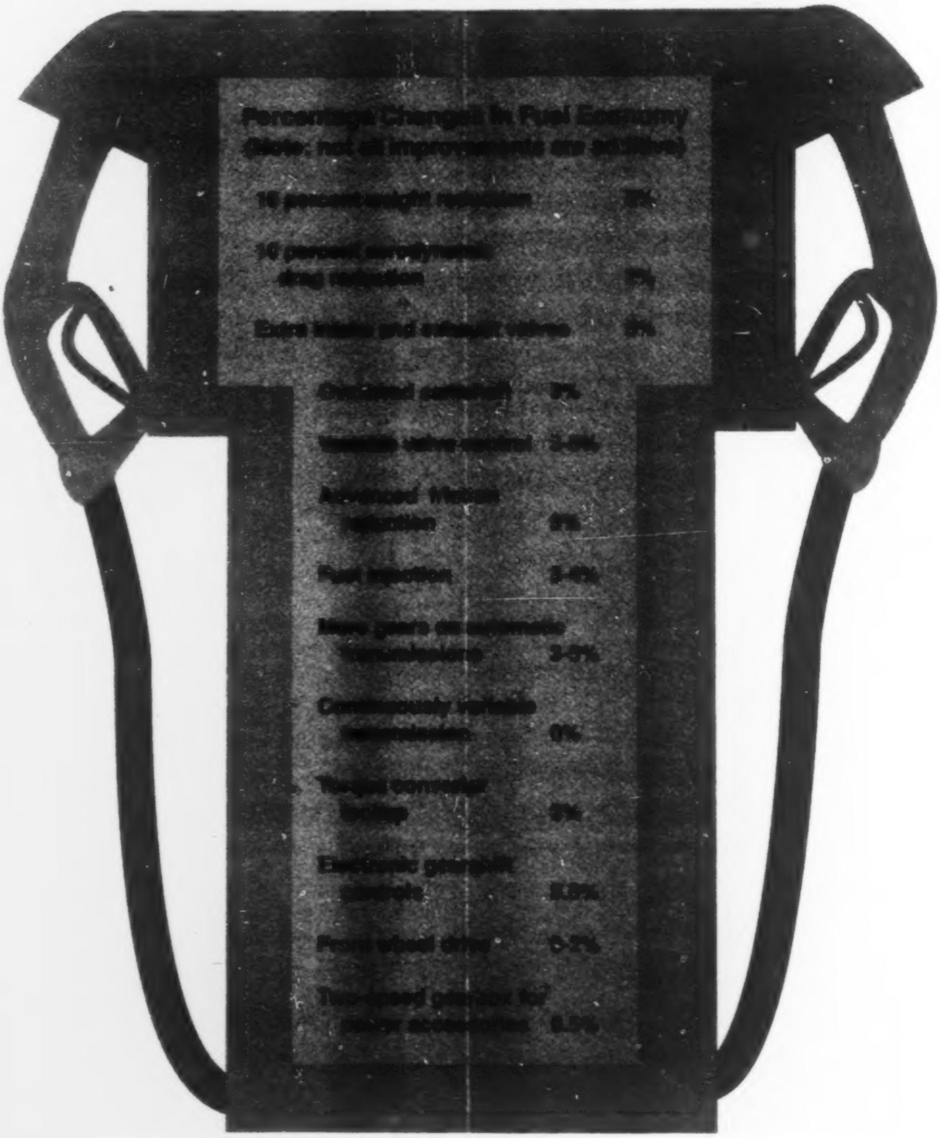
Current multivalve engines have overhead camshafts that further benefit fuel economy (see below). In fact, half or more of the estimated 5 percent improvement associated with multivalves actually comes from the overhead camshaft.

There are tradeoffs. Engineers cannot reduce engine size as much as might be expected by going to more valves, because of driveability problems associated with small multivalve engines at low speeds.

Most domestic cars still have larger two-valve-per-cylinder engines, while many Japanese models have four-valve-per-cylinder engines. However, the four-valve engine was an American invention of the 1930s, and it could be used on more domestic cars of the 1990s in order to increase fuel efficiency.

- **Changing the camshaft position** can provide an estimated 3 percent improvement in fuel economy. The camshafts in most cars used to be located low in the engine, near the crankshaft. Moving it to a higher, overhead position was an expensive proposition involving elaborate chains and belts between the camshaft and crankshaft. The advantage was — and still is — that overhead camshaft engines are more fuel efficient because they have

Technology to Meet Tougher Fuel Economy Requirements



Percentage Changes in Fuel Economy (Note: not all improvements are additive)

10 percent weight reduction	[illegible]
10 percent aerodynamic drag reduction	[illegible]
Extra intake and exhaust valves	[illegible]
Overhead camshaft	3%
Variable valve control	[illegible]
Advanced friction reduction	[illegible]
Fuel injection	3-4%
More gears on automatic transmissions	3-5%
Continuously variable transmission	6%
Torque converter lockup	3%
Electronic gearshift controls	[illegible]
Front wheel drive	0-2%
Two-speed gearbox for power accessories	[illegible]

fewer and lighter moving parts. Such engines can run faster (i.e., at higher rpms) without engine damage, so it's possible to achieve the same horsepower with a smaller engine and save fuel. Overhead camshafts allow for optimal placement of intake and exhaust ports, too, which improves efficiency. And less engine friction is created so that less energy is lost this way.

As fuel costs rose during the 1970s and early '80s, automakers began using this technology more often. Doing so has helped fuel economy, but it may not involve as much fuel saving as has been estimated. In fact, the benefits of overhead cam, multivalve cylinder heads, and other engine changes are so closely related that sometimes they are counted twice.

- **Installing variable valve control** mechanisms can provide an estimated 3 to 5 percent improvement in fuel economy by maintaining better air and fuel flow into the engine. The valves on most of today's cars are opened and closed at fixed intervals, relative to the position of the crankshaft, for all engine operating levels. Engines run more smoothly and efficiently, though, when valve openings and closings are varied according to the engine's temperature, load, speed, and other conditions.

Estimates of the fuel economy benefit associated with variable valve control differ widely because the term "valve control" actually includes a number of different technologies that affect valve timing, lift, etc. Depending on which technology is used — and whether it's programmed toward improving fuel economy or improving performance — a wide range of benefits may be estimated. These yield, on average, an approximate 4 percent improvement in miles per gallon.

- **Applying advanced friction reducing** technologies can provide an estimated 5 percent improvement in fuel economy by cutting down on the energy that's lost to friction. Such technologies include those designed to reduce the number of engine parts that contact one another. They also include technologies designed to make engine parts fit better at a wider range of operating temperatures. Pistons, for example, may be redesigned to reduce distortion and, hence, friction from contact with the cylinder wall.

Rolling along a surface inherently involves less friction than sliding, so another example of advanced friction reducing technology is a valve lift mechanism that rolls instead of slides along the camshaft. Rolling lifters are a relatively new automobile production technology, but most other known friction reducing technologies are already in place.

- **Using fuel injection** can provide an estimated 3 to 4 percent improvement in fuel economy, depending on the type of injection system that's used. Virtually all new cars have fuel injection instead of carburetors — a fuel economy as well as performance benefit because injection provides the engine with a fuel-to-air ratio that's closer to optimum for a wider range of engine conditions. Throttle-body fuel injection systems do a good job of optimizing fuel mix, and more advanced multipoint systems can do an even better job.

- **Putting more gears** on automatic transmissions can provide an estimated 3 percent improvement in fuel economy (four-speed) plus another 2 percent improvement (five-speed), compared with three-speed automatics because, simply stated, the more gears an automobile has the more time it can be operated at or near its optimum efficiency.

This may mean either optimum fuel efficiency or optimum performance — not both. The tradeoff between fuel economy and performance is so pronounced, in fact, that a three-speed automatic transmission optimized for fuel efficiency could use less gasoline than a four-speed automatic optimized for performance.

Some estimates of the fuel saving associated with four-speed automatic transmissions are overstated because they assume the additional gear will be used exclusively toward improving fuel economy without regard to performance — an unlikely assumption. Most automobiles are geared for a compromise between the two, and the Institute's 3 percent improvement estimate for a four-speed automatic assumes such a compromise.

- **Equipping cars with continuously variable automatic transmissions** probably doesn't result in any fuel saving, compared with manual five-speeds.

In theory at least, an infinite number of gears means that a car can always be operated in the optimum gear. Based on this principle, the continuously variable transmission made its debut in a 1903 Oldsmobile model. But such transmissions haven't been used in many cars over the years because, even today, only those cars with very small engines (90 horsepower or smaller) can accommodate such a technology.

Continuously variable transmissions offer virtually no fuel benefit compared with a manual transmission. Subaru's Justy equipped with a five-speed manual gets an average of 34.5 miles per gallon (city and highway), according to Environmental Protection Agency ratings, compared with 34.7 miles per gallon for the same car with a continuously variable automatic transmission.

Any benefit from continuously variable transmissions has to be realized in stop-and-go urban traffic, where a great deal of shifting is required. On the highway, continuously variable transmissions offer little or no fuel saving at all.

- **Adding a lockup** mechanism to the torque converter on automatic transmissions can provide an estimated 3 percent improvement in a car's fuel economy by eliminating the fluid energy losses associated with transmitting power from the engine to the transmission through the torque converter. About half of all new cars — mainly midsize and large cars — have torque converter lockups.

- **Equipping cars with electronic gearshift controls** can provide an estimated 0.5 percent improvement in fuel economy. With an automatic transmission, the gears are shifted according to speed, engine rpms, and other factors. Electronic controls measure these factors and then shift the gears for optimum operation — either optimum performance and acceleration or optimum fuel economy.

The reason the fuel economy benefit from this technology is so slight is that the hydraulic gearshift controls on most cars today are so well developed that a new kind of control would offer only minimal improvement. What's really pushing automakers toward using electronic controls isn't fuel economy alone — it's the fact that such controls allow drivers the freedom to switch the transmission between optimum fuel economy and optimum performance. For example, drivers with this feature can choose to switch to lower gearing on a hilly terrain, even though it may cost extra fuel.

- **Changing to front wheel drive** can improve fuel economy by up to 2 percent, compared with rear wheel drive, because front-wheel-drive cars are lighter. However, the gains in fuel economy don't even approach the 10 percent estimate mentioned in a U.S. Department of Energy report. This is primarily because the high estimate is based on comparisons between newly designed front-wheel-drive cars and older rear-wheel-drive cars of the 1970s — an invalid comparison because substantial weight reductions unrelated to the switch from rear to front wheel drive occurred at the same time.

Comparing cars for which the only substantial change is a shift from front to rear wheel drive produces much smaller weight and fuel savings.

Going to front wheel drive has allowed automakers to mount engines transversely. Most have done so, usually at the same time as substantial downsizing. So it's not surprising that many estimates of fuel saving from front wheel drive are really from the weight reductions associated with the smaller wheelbases of downsized cars.

It's important, too, that 82 percent of all 1989 cars are front-wheel-drive models. This means most of the benefit associated with this technology may already have been realized.

- **Adding a two-speed gearbox** for power accessories can provide a small improvement in fuel economy. In today's cars, engine power operates accessories like power steering at whatever speed (engine rpm level) the car happens to be operating. This means that, at higher rpms, accessories are wastefully overpowered. It's a problem that could be reduced by adding a two-speed gearbox specifically to power accessories.

Proponents of tougher fuel economy standards say the kinds of technologies discussed above can help automakers meet new requirements without further car downsizing. Senator Howard M. Metzenbaum of Ohio, for example, said proposed requirements can be accomplished "strictly by deploying familiar, off-the-shelf technologies throughout the fleet." He later added. "In no other area of energy or environmental policy can we achieve so much gain with so little pain."

But, without downsizing, it's not this simple. Some of the technologies that enhance fuel economy aren't ready to implement fully. Others are already in wide use. Front wheel drive, for example, is a feature on so many cars already that it's questionable whether it offers much potential for further fuel saving.

Some proponents of tougher standards have overlooked the fact that several technologies are related, so their benefits shouldn't be added together. Plus, these estimated benefits don't necessarily fully account for inherent conflicts between fuel economy, performance, and driveability.

An even more basic problem with estimated fuel economy benefits from various technologies is that fuel economy isn't a function of manufacturing decisions alone. It involves a complicated mix of factors including especially consumer preference.

In today's car market, consumers are purchasing energy *consuming* instead of energy *saving* features at an escalating rate. More than 85 percent of all the new cars Ford sells, for example, are equipped with automatic transmissions. Nearly 95 percent have air conditioners. These are both features that decrease fuel economy, as do other popular features such as power windows, door locks, and seats.

Another growing trend is for cars that accelerate faster — important to the fuel economy debate because a 10 percent increase in 0-60 mph acceleration time can produce a 5 percent decrease in fuel economy. Engine horsepower to automobile weight ratios have increased in every model year since 1982, costing fuel as well as occupant deaths. Institute research on death rates for 103 car series (1985-87 models) found high-performance cars accounting for four of the five with the highest death rates.

By the same token, consumers aren't purchasing cars with many of the characteristics that enhance fuel economy. Midsize cars are often marketed with either four- or six-cylinder engines, for example, but the more fuel efficient four-cylinder versions often don't sell as well as the cars with the larger engines. Diesel engines are highly fuel efficient, but they accounted for less than 0.1 percent of 1989 model new car sales, down from a high of 6 percent in the 1981 model year.

On the other hand, there are fuel-saving technologies on the horizon that motorists might accept. General Motors and Toyota, for example, have shown small cars with prototype two-stroke engines that burn less fuel than the four-stroke engines in virtually all of today's cars. Both automakers say electronic advances have solved many of the problems previously associated with two-stroke engines. They say cars with such engines could be in production as early as the 1995 model year.

But automotive technologies like the ones discussed on these pages can take us only so far toward improved fuel economy. They aren't the whole answer. Increasingly heavy traffic on U.S. roads, especially on our urban streets and highways, means lower fuel efficiency. Motorists stalled in bumper-to-bumper traffic, after all, are getting zero miles per gallon of gasoline.

The application of various technologies like front wheel drive, overhead cam, and extra transmission gears might not save as much fuel as proponents of tougher fuel economy standards expect. Why not?

- **Because some technologies are already in wide use. It's questionable whether further fuel saving is likely.**
- **Because some of the technologies aren't ready yet.**
- **Because benefits associated with more than one technology cannot always be added together.**
- **Because fuel economy improvements often involve performance tradeoffs, and some technologies are being used for performance instead of for fuel economy.**
- **Because, in today's car market, consumers are purchasing energy consuming – not energy saving – features at an escalating rate.**
- **Because, when given a choice, consumers often prefer six- over four-cylinder engines. Meanwhile, fuel efficient diesels sell poorly.**

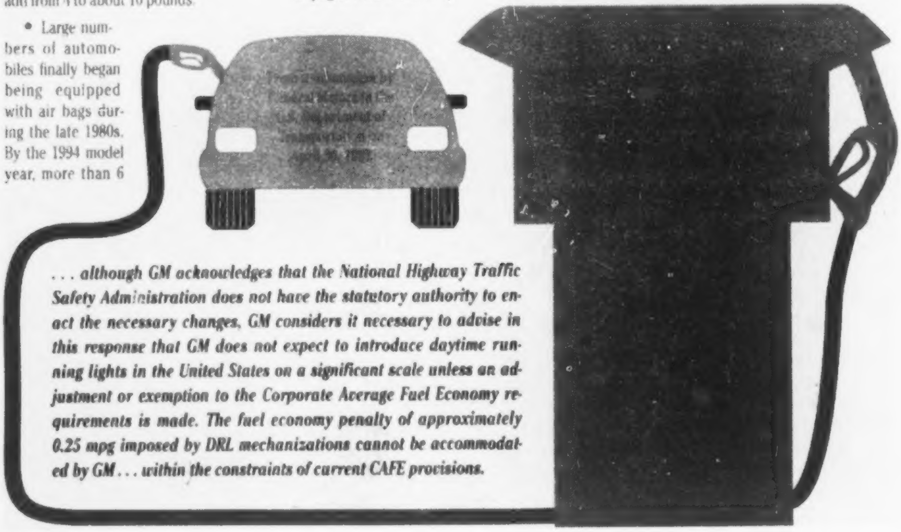
Federal Safety Standards vs. Fuel Economy . . .

Government regulatory programs tend to be administered separately, often without close coordination among agencies, and fuel economy standards are no exception. At the same time Congress was enacting the Energy Policy and Conservation Act of 1975, for example, it was encouraging gasoline consumption by imposing strict price regulation on crude oil and refined products.

Fuel economy standards are still at odds, in many cases, with passenger car safety standards. Not only have the former pushed some automakers to produce smaller, less safe cars, but also the safety features mandated by federal standards have added weight to cars, thus reducing fuel economy. For example:

- The addition of lap/shoulder belts in rear seats adds 1 to 4 pounds to the weight of a midsize passenger sedan.
- Head restraints, which are designed to reduce injuries in rear-end collisions, add from 4 to about 10 pounds.
- Large numbers of automobiles finally began being equipped with air bags during the late 1980s. By the 1994 model year, more than 6 million cars are expected to be sold with full front-seat air bags. There's no doubt lives are already being saved. This is, in fact, one of the most important motor vehicle safety advances ever. But, like many other safety features, air bags add weight — about 21 pounds per car, according to the U.S. Department of Transportation.
- High center-mounted brake lights, which add about a pound to the weight of a car and use energy, have been required equipment since the 1986 model year because they help drivers avoid crashes and lessen injury severity in the crashes that occur. These lights have been proven to reduce crashes but, at the same time, they have an adverse effect on fuel economy.
- Another example involves special running lights wired to come on automatically when the engine is turned on. Required in Canada, Norway, and Sweden, daytime running lights have been shown to reduce crashes between cars during daylight hours. But they aren't required in the United States. When the U.S. Department of Transportation considered issuing a rule to permit them, General Motors said it didn't expect to introduce daytime running lights because of the fuel economy penalty. Such penalty, which amounts to approximately 0.25 miles per gallon, might delay this important safety technology.
- Now before the U.S. Department of Transportation is rulemaking to upgrade side impact protection. If implemented, the tougher standard almost certainly will increase the weight of new cars, thus decreasing fuel economy.

The direct weight gain associated with a tougher side impact protection standard could reach about 50 pounds per car, according to regulatory impact analyses, so the fuel economy implications might be considerable. Yet such improvement is definitely needed, from a safety standpoint, to protect car occupants in side impacts.



From a submission by General Motors to the U.S. Department of Transportation on April [illegible]

. . . although GM acknowledges that the National Highway Traffic Safety Administration does not have the statutory authority to enact the necessary changes, GM considers it necessary to advise in this response that GM does not expect to introduce daytime running lights in the United States on a significant scale unless an adjustment or exemption to the Corporate Average Fuel Economy requirements is made. The fuel economy penalty of approximately 0.25 mpg imposed by DRL mechanizations cannot be accommodated by GM . . . within the constraints of current CAFE provisions.

IIHS Status Report, Vol. 25, No. 8, September 8, 1990–11

. . . and Safety-Compatible Fuel Economy Alternatives

Not all fuel conservation measures are at odds with safety — just those that encourage automakers to produce smaller cars. A safety-compatible fuel economy alternative might involve slowing cars down. Traveling faster means burning more fuel, which is why the national maximum speed limit of 55 miles per hour was adopted in the mid 1970s.

Rapid acceleration also wastes fuel. Cars with very high speed and acceleration capabilities have not only the worst fuel economy ratings but also the highest occupant death rates. So, if we produced fewer high performance cars, both safety and fuel economy would be served.

Because of engine improvements, newer cars achieve much more power per unit of engine displacement than older cars. But this advancement isn't being used entirely toward improving fuel economy. A large part of it is being used toward improving cars' acceleration and, in some cases, toward increasing top speeds.

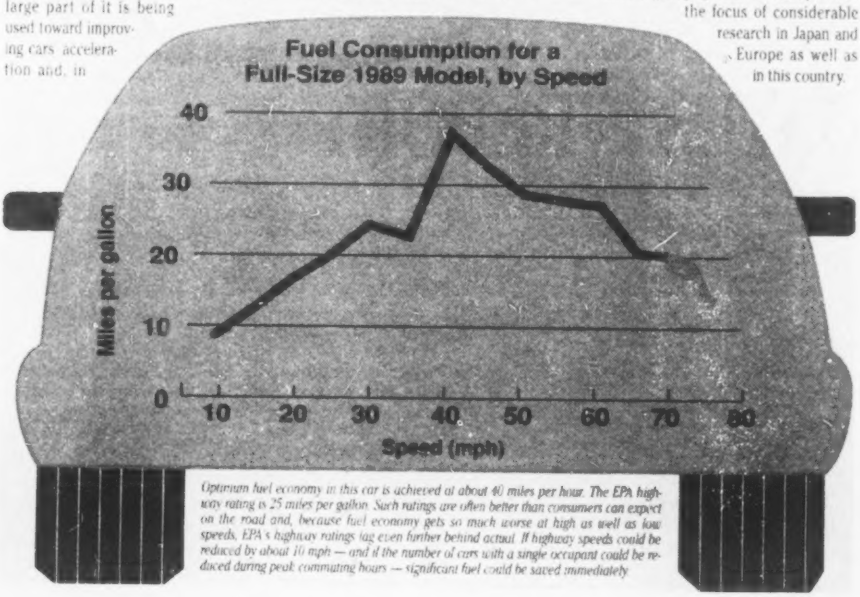
Reversing this trend and applying engine efficiency improvements to fuel economy not only would increase the miles-per-gallon average of new cars but also would enhance safety by holding down speed. If the top speed of every car were controlled electronically at, for example, 70 mph, both safety and fuel economy would gain. Current technology allows for electronic controls without any adverse effect on cars' acceleration at slower speeds.

No matter how fuel efficient our cars become, though, urban traffic management has to be improved in order for fuel to be saved. The volume of traffic on U.S. streets and highways is growing year by year. Increasingly frequent traffic snarls are wasting large amounts of motorists' time as well as their gasoline while they're slowed or even stopped in traffic jams.

A whole array of electronic features are being considered for cars and highways to help urban traffic move more smoothly. For example, roadway sensors and other surveillance devices that detect traffic conditions and automatically adjust traffic control devices (intersection and ramp metering signals, etc.) could be installed. In-car devices that receive information from these roadway sensors could help drivers navigate and avoid traffic jams, thus saving fuel.

Crash-warning devices could also be installed in cars. These would electronically sense the presence of other vehicles or objects on the road, warn drivers to brake or take evasive action, and thus reduce crashes and the traffic interruptions they cause.

These approaches to traffic management comprise the so-called "intelligent vehicle-highway system," a concept that's the focus of considerable research in Japan and Europe as well as in this country.



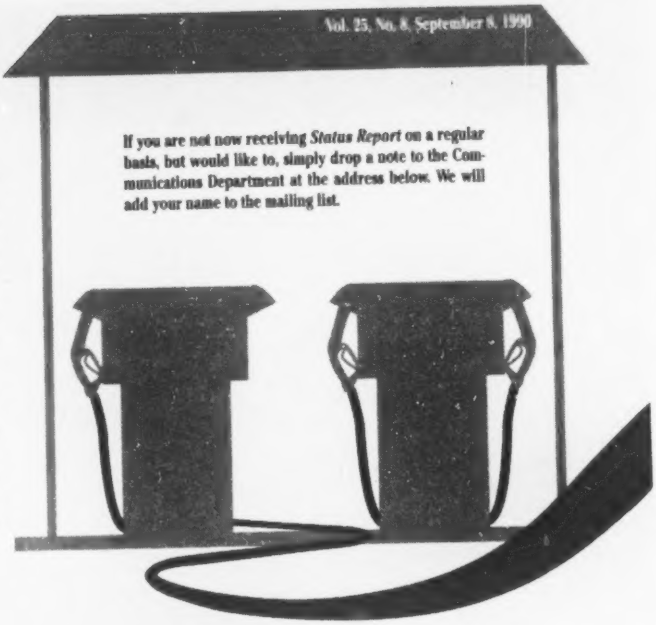
Fuel Consumption for a Full-Size 1989 Model, by Speed

Optimum fuel economy in this car is achieved at about 40 miles per hour. The EPA highway rating is 25 miles per gallon. Such ratings are often better than consumers can expect on the road and, because fuel economy gets so much worse at high as well as low speeds, EPA's highway ratings lag even further behind actual. If highway speeds could be reduced by about 10 mph — and if the number of cars with a single occupant could be reduced during peak commuting hours — significant fuel could be saved immediately.

SPECIAL ISSUE

This special issue of *Status Report* focuses on fuel economy and safety. Other recent special issues have focused on the following subjects:

Antilock Brakes for Trucks	25:5, 1990
Speeds on Rural Interstates	25:2, 1990
Death Rates by Car Series	24:11, 1989
Designing Safer Vehicles	24:8, 1989
Truck Crash Congestion	23:12, 1988
Making Traffic Laws Work	23:6, 1988
Seat Belt and Helmet Laws	22:13, 1987
NHTSA Safety Rules	22:9, 1987
Vehicle Size and Death Rates	22:2, 1987
U.S. Safety Acts	21:11, 1986
Seat Belt Use Laws	20:12, 1985
School Bus Safety	20:5, 1985
Seat Belt Use Laws	19:14, 1984
Teenagers' Driving	19:10, 1984
The Injury Fact Book	19:7, 1984
Automatic Restraints	18:18, 1983
Truck Crashes	18:4, 1983



Vol. 25, No. 8, September 8, 1990

If you are not now receiving *Status Report* on a regular basis, but would like to, simply drop a note to the Communications Department at the address below. We will add your name to the mailing list.

STATUS REPORT

INSURANCE INSTITUTE FOR HIGHWAY SAFETY

1005 North Glebe Road
Arlington, VA 22201
(703) 247-1500

Editor: James H. Mooney
Associate Editor: Rea Kerr Howarth
Editorial Assistants: Carlene Hughes, Loretta Morrison
Production: Sheila Jackson, Diahann Hill

The Insurance Institute for Highway Safety is an independent, nonprofit, scientific and educational organization. It is dedicated to reducing the losses — deaths, injuries, and property damage — resulting from crashes on the nation's highways. The Institute is supported by the American Insurance Highway Safety Association, the American Insurers Highway Safety Alliance, the National Association of Independent Insurers Safety Association, and several individual insurance companies.

Contents may be republished whole, or in part, with attribution.

ISSN 0018-988X

TECHNOLOGY ASSESSMENT BOARD
GEORGE E. BROWN, JR., CALIFORNIA, CHAIRMAN
TED STEVENS, ALASKA, VICE CHAIRMAN
EDWARD M. KENNEDY, MASSACHUSETTS
ERNEST F. HOLLINGS, SOUTH CAROLINA
CLAIBORNE PELL, RHODE ISLAND
ORRIN G. HATCH, UTAH
CHARLES E. GRASSLEY, IOWA
MORRIS K. UDALL, ARIZONA
JOHN D. DINGELL, MICHIGAN
CLARENCE E. MILLER, OHIO
DON SUNDQUIST, TENNESSEE
AMO HOUGHTON, NEW YORK
JOHN H. GIBBONS

JOHN H. GIBBONS
DIRECTOR

Congress of the United States
OFFICE OF TECHNOLOGY ASSESSMENT
WASHINGTON, DC 20510-8025

April 30, 1991

The Honorable Bennett Johnston
Chairman
Energy and Natural Resources Committee
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

In my written testimony before your Committee on March 20, 1991, some of the fuel economy tables contained some typographical and other errors. Although these errors do not materially affect our projections, I am nevertheless concerned that our testimony be as accurate as possible. I have therefore attached corrected versions of the tables containing errors, which I hope you will make available to the Committee. In addition, I would like to call your attention to some small numerical errors in the text. On page 6 of my testimony, I stated, correctly, that our product plan fuel economy for the total fleet in 1995 was 29.2 mpg. When I repeated the product plan value on page 7, I inadvertently changed the value to 29.3 mpg, which is incorrect. And on page 8, the correct domestic fleet product plan fuel economy for 2001 is 32.1 mpg, not 31.9 mpg, and the total fleet product plan fuel economy for 2001 is 32.9 mpg, not 33.4 mpg; the domestic fleet max technology fuel economy for 2001 is 37.3 mpg, not 37.2 mpg, and the total fleet max technology fuel economy for 2001 is 38.3 mpg, not 38.4 mpg.

I apologize for these errors.

Sincerely,

Steven Plotkin
Senior Associate

Enclosure

TABLE 1A

REVISED PROJECTION

U.S. DOMESTIC MANUFACTURERS

1995 PRODUCT PLAN CASE

(Does not include test adjustments)

Technology	F/E Gain (%)	Penetration Increase from 1987 (%)	1995 (%) Penetration	Fleet (% F/E Gain
Front Wheel Drive	10.0	12	86	1.20
Drag Reduction (C_D -0.33)	2.3/4.6**	65/15	-100	2.19
4-speed Automatic Transmission	4.5	40	80	1.80
Torque Converter Lock-up	3.0	20	80	0.60
Electronic Transmission Control	0.5	80	80	0.40
Accessory Improvements	0.5	80	N/M	0.40
Lubricant/Tire Improvements	1.0	100	100	1.00
Engine Improvements				
- Advanced Pushrod	3.0	(40)	(30)	1.20
- Overhead Camshaft	3.0	45	69	1.35
- Roller Cam Followers	2.0	40	95	0.80
- Low Friction Pistons/Rings	2.0	80	100	1.60
- Throttle Body FI	3.0	12	40	0.36
- Multi-point FI (over throttle body)	3.0	12	60	0.36
4 valves per cylinder engine				
- 4 cylinder replacing 6*	8.0	18	18	1.44
- 6 cylinder replacing 8*	8.0	12	12	0.96
Total F/E Benefit				15.66 %

* 1987 distribution: 20.5% V-8, 29.5% V-6, 50% 4 cylinder

** Drag reduction for large/luxury cars from C_D - 0.42 baseline.

TABLE 15

1995
IMPORT MANUFACTURERS
FUEL ECONOMY

(FIVE LARGEST JAPANESE MANUFACTURERS ONLY)

(Does not include test adjustments)

Technology	F/E Gain (%)	Penetration Increase from 1988 (%)	1995 (%) Penetration	Fleet (%) F/E Gain
Front Wheel Drive	5.0	3	90	0.15
Drag Reduction I	2.3	80	~100	1.84
4-speed Auto. Trans.	4.5	16	47	0.72
Torque Converter LU	3.0	9	53	0.27
Elec. Trans. Control	0.5	44	47	0.22
Accessory Improvements	0.5	80	N/A	0.40
Tires/Lubricants	1.0	100	100	1.00
Roller Cam Followers	2.0	50	50	1.00
Low Friction Piston/Rings	2.0	80	100	1.60
Throttle Body FI**	2.0	25	20	0.50
Multi-Point FI	3.0	20	75	0.60
4 Valves/Cylinder	5.0	20	44*	1.00
TOTAL F/E BENEFIT (%)				9.30

* Additional 6 percent are 3-valve/cylinder.

** Benefit of TBI is lower than for domestic cars because air pumps are not used in carbureted import cars.

TABLE 1C

1995 PRODUCT PLAN
U.S. DOMESTIC LDV FLEET

(Does not include test adjustments)

1987 Fuel Economy:	26.7 MPG
1995 Fuel Economy w/o size or peformance increase	30.9 MPG
Size/weight Increase	-1.4 MPG
Performance Increase	-0.7 MPG
Effect of Emission/Safety Standards	-0.8 MPG
1995 Product Plan F/E	28.0 MPG

TABLE 1D

1995
IMPORT MANUFACTURERS
FUEL ECONOMY

(Does not include test adjustments)

1988 Fuel Economy	31.4 MPG
1995 Fuel Economy without size or performance increase	34.32 MPG
Size/Weight increase	-1.66 MPG
Performance Increase	-0.90 MPG
Effect of Safety/Emission Std.	-0.94 MPG
1995 Product Plan F/E	30.82 MPG

TABLE 2

POTENTIAL DOMESTIC CAR FUEL ECONOMY IN 2001 UNDER ALTERNATIVE SCENARIOS

(Does not include test adjustments)

	Fuel Economy Benefit	Product Plan		Max. Technology	
		Mkt. Pen. 1995-01	F/E	Mkt. Pen. 1995-01	F/E
Weight Reduction	3.3/6.6	80	2.64	80	5.28
Drag Reduction	1.15/2.3	80	0.92	80	1.84
Intake Valve Control[1/]	6.0	40	2.40	70	4.20
Overhead Cam Engines	3.0	30	.90	30	.90
6 cyl./4V replacing 8 cyl.	8.0	4	0.32	8	0.64
4 cyl./4V replacing 6 cyl.	8.0	6	0.48	12	0.96
4 cyl./4V replacing 4 cyl.	5.0	10	.50	50	2.50
Multi-point fuel injection (over TBI)	3.0	40	1.20	40	1.20
Front wheel drive	10.0	5	0.50	13	1.30
5-speed auto. transmission[2/]	2.5	20	0.50	40	1.00
Continuously variable transmission[2/]	3.5	15	0.52	30	1.05
Advanced engine friction reduction	2.0	100	2.00	100	2.00
Electric Power Steering	1.0	5	0.05	30	0.30
Tire Improvements	0.5	100	0.50	100	0.50
Total F/E Benefit (%)			13.03[1/]		22.67[1/]
Unadjusted CAFE (MPG)			31.65		36.9

Note: Product plan scenario starts from a different 1995 base than the maximum technology scenario which holds performance and size constant at 1987 levels.

[1/] Synergy of intake valve control with 5-speed/CVT transmissions results in a loss of 2 percent in fuel economy.

[2/] Over 4-speed auto transmission with lock-up.

TABLE 2B

IMPORT MANUFACTURERS
FUEL ECONOMY IN 2001

(FIVE LARGEST JAPANESE MANUFACTURERS ONLY)

(Does not include test adjustments)

Technology	F/E Benefit (%)	Product Plan (%) Mkt. Pen.	Product Plan (%) F/E Gain	Maximum Technology (%) Mkt. Pen.	Maximum Technology (%) F/E Gain
Weight Reduction	3.3/6.6	90	2.97	90	5.94
Drag Reduction	1.15/2.3	80	0.92	80	1.84
Intake Valve Control*	6.0	30	1.80	60	3.60
4-Valve Engine	5.0	10	0.50	50	2.50
Multi-point FI	3.0	25	0.75	25	0.75
Front Wheel Drive	10.0	0	0.00	5	0.50
5-Speed Auto. Trans.	2.5	6	0.15	12	0.30
CVT	3.5	26	0.91	40	1.40
Advanced Friction Reduction	2.0	100	2.00	100	2.00
Electric Power Steering	1.0	10	0.10	35	0.35
Tire Improvements	0.5	100	0.50	100	0.50
Roller Cam Followers	2.0	30	.60	30	0.60
TOTAL F/E BENEFIT (%)			11.00 *		19.78*
2001 MPG			34.2 mpg		40.0 mpg

* Synergy with 5-spd auto-transmission/CVT results in 2 percent loss in F/E when both technologies are used in the same vehicle.

Volkswagen of America, Inc.

490 L' Enfant Plaza S.W.
Suite 7204
Washington, D.C. 20024
Tel. (202) 484-6096

Joseph W. Kennebeck
Director,
Government Affairs

May 2,1991

The Honorable J. Bennett Johnston
Chairman, Energy and Natural
Resources Committee
United States Senate
Washington, DC 20510

Dear Chairman Johnston:

In the Committee's deliberations over future automobile fuel economy standards, the information below may assist in clarifying the role of Diesel passenger cars in the nation's light duty fleet.

Volkswagen of America is one of the two automobile companies offering Diesel-powered models in the U.S. at the present time. The one model we offer, the VW Jetta Diesel, is not popular with buyers even though it was listed by EPA as one of the "Ten Highest Mileage Cars," with fuel economies of 37 mpg (city) and 43 mpg (highway). For the first quarter of this year Jetta Diesel sales were 2.8% of overall Volkswagen of America sales of passenger cars and vans.

A few of the reasons why we think the Jetta Diesel is not high on the auto shopper's list are:

- Maximum output is 52 hp, compared with 100 hp for the gasoline engined version of the same car;
- Only a manual 5-speed transmission is offered, in order to maximize the available power output;
- 0-60 mph acceleration is 16.3 sec, compared to 9.8 sec for the comparable gasoline engined Jetta;
- top speed is 88 mph, compared with 110 mph for the comparable gasoline engined version;
- Diesel fuel is significantly more expensive than the unleaded regular gasoline used by our other models; Diesel fuel prices are usually between the price for premium grade and the price for super grade.

It should also be pointed out that emission standards constrain sales of Diesel cars. Because California has a 0.08 gpm particulate standard which cannot be met by current technology, we do not offer the Jetta Diesel for sale in that state, one of our major markets for the other models.

For the 1994 model year, this 0.08 gpm particulate standard will apply in all 50 states because of the amendments to the Clean Air Act adopted by Congress last year. If we do not develop technology to meet this particulate standard we will no longer be able to offer Diesel cars. At this time, we are not certain that technology will be ready for the 1994 MY, although we are evaluating a particulate trap with regenerative cycle initiated by a fuel-additive metering device. In earlier versions, the additive was manganese-based, but current versions favor an iron-based additive. Of course the trap, metering unit, and associated plumbing and control system add weight and complexity to the car, and horsepower is somewhat degradated by the added back-pressure of the trap.

This trap solution only applies, of course, to the so-called "Tier 1" standards which go into effect for the 1994 MY, when the corresponding Diesel NOx standard is 1.0 gpm. (Particulate control and NOx control are at odds with each other.) If "Tier 2" standards as prescribed in the Act are adopted by EPA beginning with the 2004 MY, Diesel viability is highly questionable because the NOx standard for gasoline vehicles of 0.2 gpm will apply to Diesel vehicles as well. No technology is on the horizon to meet a Diesel NOx standard of this stringency.

In conclusion, the foregoing does not paint an optimistic picture for Diesel vehicles as a significant contributor to a manufacturer's CAFE. In addition to future technology constraints on the emissions side, sales of Diesels are naturally constrained by consumer reluctance to place fuel economy advantages over other vehicle attributes. Consumer choice is at least as important as technology in the CAFE equation.

Thank you for consideration of our views.

Yours truly,

Joseph W. Kennebeck

Volkswagen of America, Inc.

490 L' Enfant Plaza S.W.
Suite 7204
Washington, D.C. 20024
Tel. (202) 484-6096

Joseph W. Kennebeck
Director,
Government Affairs

April 26, 1991

The Honorable J. Bennett Johnston
Chairman, Energy and Natural
Resources Committee
United States Senate
Washington, DC 20510

RE: S. 341, CAFE

Dear Chairman Johnston:

During the course of hearings on automobile fuel economy legislation this year and in the previous Congress, reference has been made by some parties to certain Volkswagen prototype research vehicles, the E-80 and the Auto 2000 Project.

These parties assert that the fuel economy levels of these vehicles are some kind of "proof" that higher CAFE standards are achievable.

The fuel economy levels of these vehicles have no bearing on the potential for higher CAFE levels for fleets of production vehicles. They were research projects, pure and simple.

I am enclosing some documentation to show that Volkswagen in no way views these prototype cars as practicable, nor that they are transferable into production vehicles.

First, enclosed is a letter of November 1, 1988 from Dr. Wolfgang Lincke to Mr. Steven Plotkin of the Office of Technology Assessment. Dr. Lincke is the Chief Engineer for Volkswagen AG at the company's headquarters in Wolfsburg, Germany. He participated in the OTA fuel economy workshop in Washington, D.C. in September, 1988.

Second, enclosed is an excerpt from a submission by Mr. Plotkin of July 20, 1989 to Representative John Dingell in response to an inquiry by Chairman Dingell about the VW prototype cars (question no. 12). Note at the end of Mr. Plotkin's response to this question the criteria for determining the relevance of a prototype to a production vehicle. It is clear that the VW E-80 does not fulfill these criteria.

Third, enclosed is a page (from around 1980-81) describing the VW Auto 2000 Project. This project was a research vehicle platform that incorporated several various research initiatives -- it wasn't really a "car," in the sense that it wasn't even a prototype for a car. It could be equipped with various types of engines, including the same 45-hp, 3-cylinder, direct-injected Diesel used in the E-80. A more conventional 75-hp gasoline engine was also on the project's powertrain list, with, of course, much better performance and much lower fuel economy than the Diesel. As the second paragraph of the enclosed text describes, the results of this project should not be claimed as a prototype for an already pre-planned production model. The Auto 2000 Project examined several vehicle attributes not linked to fuel economy, such as assembly-line construction techniques, passenger compartment cooling system, instrument panel information displays, and advanced folding rear-seat design.

I hope the foregoing and the enclosures clear up any misconceptions about the VW E-80 and Auto 2000 Project.

Yours truly,

Joseph W. Kennebeck

Joseph W. Kennebeck

JWK/eg
enclosures

VOLKSWAGEN

VOLKSWAGEN AG · Postfach · 3180 Wolfsburg 1

Mr. Steven Plotkin
Office of Technology Assessment
600 Pennsylvania Avenue, S.E.
Washington, DC 20003

Ihre Zeichen	Ihre Nachricht vom	Unsere Zeichen	Unser Hausapparat	Datum
		1716-drli-wb	23570	01.11.1988

Dear Mr. Plotkin,

Thank you for your letter regarding the Workshop held on September 13, 1988. I, too, appreciated the opportunity to participate and to offer our views on the fuel economy issues raised at the workshop.

To answer your inquiry about prototype vehicles, I can offer the following:

The last Volkswagen research prototype with an internal combustion engine aimed at fuel economy gains was a vehicle designated the VW E80, which was tested at our facilities in 1980 and by the U.S. E.P.A. in 1981. The E80, to use your phrase, was a "one of a kind, experimental model" that could not be introduced into series production for the U.S. market because (a) the vehicle type was based on a VW Polo, VW's smallest model which is sold only in Europe and which does not meet U.S. safety standards; (b) the engine was a supercharged, direct-injected diesel which would not meet current CARB and projected U. S. emission standards; and (c) the vehicle possessed characteristics that would hardly be accepted by U.S. consumers, among them a 0-60 mph acceleration time of 26.5 seconds, and an engine stop/start device for in-use driving that would unnerve many (if not most) drivers. In short, the E80 was an excercise in direct-injected diesel engine technology to achieve a combined fuel economy measurement of 80 mpg, which it did; it was not a vehicle with an overall set of attributes acceptable to the public and worthy of large-scale production.

In conjunction with the workshop itself, I would like to state that I have concludet that there was a consensus that the potential fuel economy gains offered in Mr. Duleep's paper were overly optimistics. As I mentioned at the time, there ist no significent fuel economy gain to be achieved by a four-valve/cylinder engine over a comparable two-valve engine; Mr. Duleep's estimate of a 10% gain is simply not supportable. I also would like to repaet my observation at the workship that gains in aerodynamics, i.e. reduced C_D, are gotten at the expense of increased weight when C_D-values below 0,3 are taken into consideration. And, as a last point, I believe we are all in agreement that two-stroke engines, which Mr. Duleep projected as ofering a 10-15% fuel economy gain, are not viable power plants for the future because of emissions limitations.

I am looking forward to OTA's final product that will incorporate the findings of the workshop, and I wish you every success in this endeavor. Please feel free to contact me further, should the need arise.

Best regards.

Sincerely,

Wolfgang Lincke

TECHNOLOGY ASSESSMENT BOARD
EDWARD M. KENNEDY, MASSACHUSETTS, CHAIRMAN
CLARENCE E. MILLER, OHIO, VICE CHAIRMAN
ERNEST F. HOLLINGS, SOUTH CAROLINA
CLAIBORNE PELL, RHODE ISLAND
TED STEVENS, ALASKA
ORRIN G. HATCH, UTAH
CHARLES E. GRASSLEY, IOWA
MORRIS K. UDALL, ARIZONA
GEORGE E. BROWN, JR., CALIFORNIA
JOHN D. DINGELL, MICHIGAN
DON SUNDQUIST, TENNESSEE
AMO HOUGHTON, NEW YORK
JOHN H. GIBBONS

Congress of the United States
OFFICE OF TECHNOLOGY ASSESSMENT
WASHINGTON, DC 20510-8025

JOHN H. GIBBONS
DIRECTOR

To: MKC
DBF

RECEIVED
89 JUL 21 PM 4:32
SUBCOMMITTEE ON
OVERSIGHT AND INVESTIGATIONS

July 20, 1989

The Honorable John D. Dingell
Chairman
Subcommittee on Oversight and Investigations
Committee on Energy and Commerce
U.S. House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

In your letter of June 21, 1989, you asked a number of questions concerning my testimony on the fuel economy potential of the light duty fleet, and OTA's ongoing work on this potential. I have attempted to answer all of your questions in the attached discussion. I welcome your further comments and questions.

Sincerely,

Steve Plotkin

Steven Plotkin
Senior Associate

Enclosure to DBF only

cc: The Honorable Thomas J. Bliley, Jr., Ranking Minority Member
Subcommittee on Oversight and Investigations

The Honorable Philip R. Sharp, Chairman
Subcommittee on Energy and Power

The Honorable Carlos J. Moorhead, Ranking Minority Member
Subcommittee on Energy and Power

The Honorable Samuel K. Skinner, Secretary
Department of Transportation

The Honorable James D. Watkins, Secretary
Department of Energy

Mr. Jeffrey R. Miller, Acting Administrator
National Highway Traffic Safety Administration

The Honorable William K. Reilly, Administrator
Environmental Protection Agency

Mr. George C. Nield, President
Automobile Importers of America

Mr. Thomas Hanna, President
Motor Vehicle Manufacturers Association

with the dual problems of poor air quality and rising oil imports, the U.S. will have to attack these problems with emission controls and fuel economy technology *as well as* with other strategies, including traffic controls to ease congestion, strategies to reduce travel demand (especially at peak periods), and introduction of alternative fuels. In other words, because the problems have a variety of causes, a variety of solutions must be addressed simultaneously.

11. *You list several actions urged by the energy conservation community. One set is to raise gasoline prices, raise the purchase price of fuel/inefficient vehicles, and possibly lower the purchase price of fuel-efficient vehicles. None of these seem likely to occur soon. However, have you considered the effect of various taxes or fees by State and local governments (such as personal property taxes) on cars that are higher for new fuel-efficient and clean vehicles while low for old, inefficient and dirty vehicles? Do they harm efforts toward efficiency and emission control?*

OTA has not considered the effect of State and local personal property taxes on fleet turnover -- which would be the mechanism by which such taxes might affect fuel use and air quality. We would agree that taxes that rise with the value of the vehicles do tend to discriminate against newer, and thus more fuel-efficient and cleaner, vehicles. By making it relatively more expensive to own and operate a newer vehicle, these taxes may have some effect in slowing down the purchase of new cars and thus slowing down the fleet turnover that is the most effective mechanism for improving the fleet's fuel efficiency and reducing its emission levels. We cannot estimate the magnitude of this effect, however.

12. *This Community also mentions some prototypes which are mentioned at Table 2 of your statement. Volkswagen in a letter to you, Mr. Plotkin, commented on its prototype as follows:*

> *The last Volkswagen research prototype with an internal combustion engine aimed at fuel economy gains was a vehicle*

> *designated the VW E80, which was tested at our facilities in 1980 and by the U.S. EPA in 1981. The E80, to use your phrase, was a ''one of a kind, experimental model'' that could not be introduced into series production for the U.S. market because (a) the vehicle type was based on a VW Polo, VW's smallest model which is sold only in Europe and which does not meet U.S. safety standards; (b) the engine was not a supercharged, direct-injected diesel which would not meet current CARB and projected U.S. emission standards; and (c) the vehicle possessed characteristics that would hardly be accepted by U.S. consumers, among them a 0-60 mph acceleration time of 26.5 seconds, and an engine stop/start device for in-use driving that would unnerve many (if not most) drivers. In short, the E80 was an exercise in direct-injected diesel engine technology to achieve a combined fuel economy measurement of 80 mpg, which it did; it was not a vehicle with an overall set of attributes acceptable to the public and worthy of large-scale production.*

The DOT also discusses these prototypes (see question 5).

While prototypes are important, do you agree that reliance on such a vehicle as a basis for regulatory action is not realistic?

As you know, in my testimony I have explicitly warned against placing too much reliance on the fuel economy performance of prototypes. For example, in my testimony before your Oversight and Investigations Subcommittee, I stated:

> The performances of "one of a kind" vehicle prototypes are instructive but far from conclusive in determining market acceptability.

However, I would not dismiss these prototypes as irrelevant; if they were, then one should ask why companies build them in the first place. Although I would not dismiss out of hand the argument that some may be built for show purposes, that is, to illustrate to the public a company's environmental and social consciousness, I doubt that this is the sole reason.

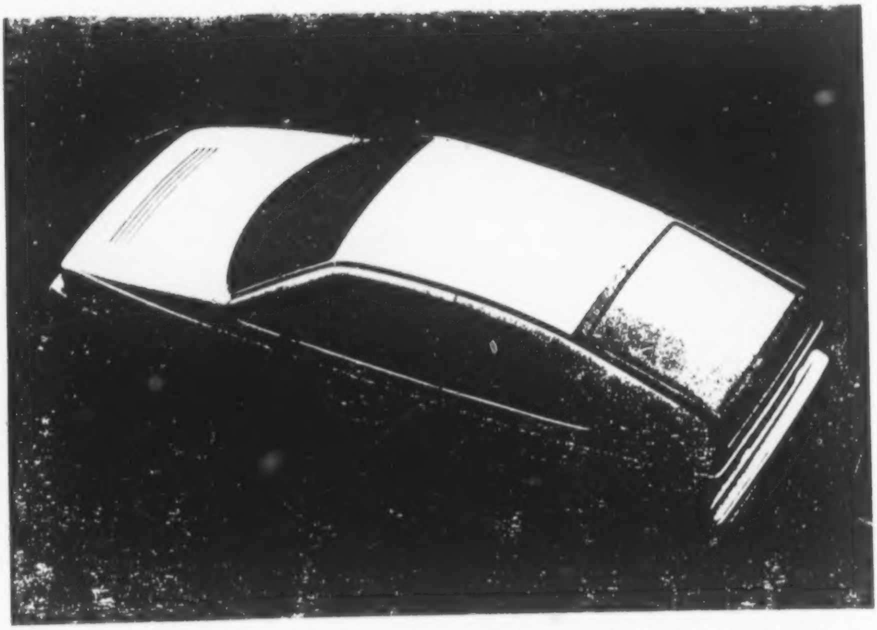
In OTA's view, determination of the relevance of a particular prototype should be based on:

- whether or not the vehicle's basic performance characteristics are within the performance "envelope" acceptable to consumers,
- whether or not the vehicle meets U.S. safety and emissions requirements,
- the developing company's assessment of potential manufacturing difficulties and costs,
- an assessment of the timetable necessary to bring each of the vehicle's prototype technologies to full commercialization, and
- comparison of the prototype's fuel economy to that of fleet vehicles in its size class.

13. *Your testimony states that "the achievable fuel efficiency level will be lower (than 33 mpg by 1995) if trends toward higher power and towards certain efficiency-reducing options (such as four-wheel drive) are not halted" It is our understanding that the options you mention -- four-wheel drive, or, as noted later, anti-lock braking -- provide distinct traction, stability, handling and safety benefits. In short, they have other important social benefits. I presume that you would agree that such safety features are no less important than fuel economy improvements. How do you balance the two?*

Obviously, it is extremely difficult to place competing values on fuel economy benefits and benefits in safety, and appropriately trade off one against the other. Generally, OTA would not try to balance the two benefits. Instead, we would try to present a careful analysis of the benefits and costs associated with the potential tradeoff, to assist Congress in doing the "balancing."

In the specific case of the two technologies mentioned, four wheel drive and anti-lock braking, I note that there is a strong difference



Volkswagen – Auto 2000

Die Forschung ist ein [illegible] Grundstein der Marktwirtschaft, dem die westliche Welt ihren Wohlstand verdankt. Wo der Erfolg nur dem winkt, der sich im weltweiten Wettbewerb gegen Konkurrenten zu behaupten weiß, muß eine zielstrebige Forschung die Lösungen für Probleme der [illegible] Zukunft zu finden suchen und die Ergebnisse nach sorgfältiger Erprobung in optimal geeignete Produkte umsetzen. Ernsthafte Forschung ist nicht nur eine schwierige Aufgabe, sie erfordert erhebliche technische und finanzielle Mittel und ist nicht frei von Risiken, denn nicht alle Schüsse treffen unmittelbar ins Schwarze.

In einem Land wie der Bundesrepublik, in dem jeder siebente Bürger seinen Lebensunterhalt direkt oder indirekt im Zusammenhang mit der Fertigung, dem Betrieb oder der Versorgung von Autos bestreitet und das im Automobilbau und Automobilexport über Wirtschaftsfaktoren von erstrangiger Wichtigkeit verfügt, steht das Automobil ganz natürlich mitten im Scheinwerferlicht des öffentlichen Interesses. Energieverknappung, Verkehrssicherheit und Abgasdiskussionen lösen Fragen nach der Zukunftsentwicklung des Autos aus. Die allgemeine Zielsetzung ist klar: das Auto von übermorgen muß sparsamer mit seinem Kraftstoff umgehen, hohe Fahrzeugsicherheit besitzen, es muß leiser laufen, weniger Schadstoffe in seinem Abgas emittieren und möglichst weitgehend aus Werkstoffen gebaut sein, die nach Ablauf seiner Dienstzeit aufgearbeitet und erneut verwendet werden können.

Das Projekt Auto 2000 des Volkswagenwerks in Zusammenarbeit mit wichtigen Zulieferfirmen überspringt als integriertes, betriebsfähiges Gesamtkonzept einen Zeitraum von 20 Jahren in die Zukunft. Das Ergebnis [illegible] den Anspruch, Prototyp für ein schon vorgeplantes Serienmodell zu sein. Es soll vielmehr unter Berücksichtigung heute bekannter bzw. absehbarer Einflußfaktoren die Möglichkeiten aufzeigen, voraussichtlichen wirtschaftlichen, ökologischen und gesellschaftlichen Forderungen einer Zukunft zu genügen, wie sie sich etwa im Zeitabschnitt der späten 90er Jahre zeigen könnte.

Die Erstellung eines solchen Forschungsobjekts würde sicherlich die technischen und wirtschaftlich akzeptablen Möglichkeiten eines einzelnen Unternehmens übersteigen, insbesondere dann, wenn sie [illegible] innerhalb eines fest begrenzten und sehr knappen zeitlichen Rahmens erfolgen soll. Das Volkswagenwerk konnte sich dieser aufwendigen, aber äußerst reizvollen Aufgabe unterziehen, weil einerseits das Bundesministerium für Forschung und Technologie einen fünfzigprozentigen Förderbetrag einbrachte und andererseits eine Anzahl von namhaften Zulieferunternehmen der Kraftfahrzeugindustrie wertvolle Unterstützung in Form von Eigenentwicklungen [illegible]

[illegible]

ASSOCIATION OF INTERNATIONAL AUTOMOBILE MANUFACTURERS, INC.
1001 19TH STREET NORTH, SUITE 1200 • ARLINGTON, VIRGINIA 22209 • (703) 525-7788 • FAX (703) 525-8817

CHAIRMAN
J. REILLY
ISUZU

1ST VICE CHAIRMAN
D. SMITH
TOYOTA

2ND VICE CHAIRMAN
P. HUTCHINSON
VOLKSWAGEN

TREASURER
Y. SUZUKI
NISSAN

SECRETARY
W. KENNEDY
ROLLS-ROYCE

BMW
DAIHATSU
FERRARI
HONDA
HYUNDAI
ISUZU
JAGUAR
MAZDA
MITSUBISHI
NISSAN
PEUGEOT
PORSCHE
ROLLS-ROYCE
ROVER
SAAB
SUBARU
SUZUKI
TOYOTA
VOLKSWAGEN
VOLVO
YUGO

PRESIDENT
G. NIELD

29 April, 1991

The Honorable Bennett Johnston, Chairman
Energy and Natural Resources Committee
United State Senate
Washington, D.C. 20510

Dear Senator Johnston:

The Association of International Automobile Manufacturers (AIAM) would like to submit additional information for the record on the hearings held on S. 341 regarding fuel economy. This additional information concerns claims made about fuel economy concept cars produced over a decade ago.

Advocates of higher CAFE requirements continue to tout "prototype" vehicles that were produced in the late 1970s as proof that much higher CAFE levels can be achieved with little effort and no significant change in the vehicle fleet. Such claims are false and data used to support these claims are incorrect. Information of one of these vehicles is attached.

First, these vehicles are not prototypes, but rather concept cars which were built to study what levels of fuel economy could be achieved with other important design constraints ignored. The simple fact is that these cars are out of date and have no relevance in today's debate -- one of the Renault vehicles cited used a carbureted fuel system, a fuel management system that has been replaced by fuel injection for better fuel economy and emissions control.

There are cars being produced today that achieve fuel economy levels equal to these concept cars, but they represent **less than one percent** of the market because they don't meet the needs of the vast majority of American consumers. The Honda CRX HF is a two seater with a four-cylinder engine that achieves a "CAFE" rating of 59 mpg. The Geo Metro XFI is a four-place hatchback with a three-cylinder engine that has a "CAFE" rating of 65 mpg.

The simple fact is that significant gains in fuel economy will only be achieved with size and weight reductions which will restrict the choice of vehicles available to consumers. Mandating small cars is illogical and counter productive. Larger cars are a more fuel efficient choice than multiple small cars for those with large families and those who need a vehicle for carpooling.

We again commend the Committee for the comprehensive view taken in S. 341 that would consider fleet size mix, utility and performance as well as the effect of emissions and safety standards on the ability of manufacturers to design vehicles for higher fuel economy performance.

We appreciate the opportunity to express our views. If there are any additional questions on this matter, please contact me.

Sincerely,

Gregory J. Dana
Vice President and
Technical Director

GD:set
Enclosure

Vehicle:	Volvo LCP 2000
Seating Capacity:	CAFE advocates claim this vehicle is a four-seater. In fact, it is a two seater, with a folding seat in the cargo area. Use of this seat eliminates any cargo carrying capacity.
Vehicle Weight:	Curb weight of this concept car is 1555 pounds, much lighter than today's vehicles.
Structure:	There is extensive use of light weight materials in this vehicle. The frame and brake drums are aluminum. The wheels, clutch and gearbox housings are magnesium. The body is plastic with polycarbonate windows and carbon fibre door arches. While no overall cost estimate was provided for this vehicle, such materials are not currently used in large quantity by the industry mainly due to their high cost, relative to light weight steels.
Emissions:	This vehicle fails to meet both the current Federal hydrocarbon and particulate standards and would not meet the standards adopted in the Clean Air Act amendments. It meets the NOx standard because of the special NOx waiver for diesels. It could not meet the Tier II NOx limit. Modifications to meet standards would likely increase the fuel consumption of the vehicle. In that case, at least one of today's production cars would be **more** fuel efficient than this concept car.
Engine:	The engine used is a three-cylinder direct-injection diesel. Diesel engines are virtually non-existent in the U.S. market except for a few low-selling VW and Mercedes models. Consumers have shown little interest in diesel engines in this country.
Safety:	CAFE advocates claim that this vehicle meets all safety standards. The crashworthiness data for the vehicle is based on half scale model testing. No LCP 2000 has ever been crash tested, so no confirmation of the model results has been done. If additional structure were to be needed, fuel consumption would suffer.

ACE3 American Council for an Energy-Efficient Economy

1001 CONNECTICUT AVE., N.W. SUITE 535 WASHINGTON, DC 20036 (202) 429-8873

1 May 1991

J. Bennett Johnston
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, DC 20510-6150

Re: Additional materials for the hearing record of S. 341

Dear Senator Johnston:

Enclosed please find two additional items for inclusion in the Committee's record regarding the light vehicle fuel economy provisions of S. 341:

(1) A critique of "The Effect of Fuel Economy Standards on Automobile Safety" by Crandall and Graham, prepared by Marc Ledbetter, ACEEE (September 1989).

(2) "A Note on CAFE Credits" prepared by myself (23 April 1991), pointing out why credit provisions should be based on estimated changes in gallons of fuel consumed rather than simple differences in MPG.

You are most welcome in your requests to ACEEE for comments on energy legislation; please contact me if we can be of further assistance.

Sincerely,

John M. DeCicco

John M. DeCicco, Ph.D.
Research Associate

American Council for an
Energy-Efficient Economy

1001 CONNECTICUT AVE., N.W. SUITE 535 WASHINGTON, DC 20036 (202) 429-8873

A Note on CAFE Credits

John DeCicco, 23 April 1991

If CAFE credits are measured as the number of miles per gallon (MPG) by which a manufacturer's CAFE exceeds a standard, credit schemes can result in excess gasoline consumption. The goal of standards is conserve fuel, so any aspects of the regulation developed to allow flexibility to manufacturers should do so only to the extent that there is no compromise of the fuel savings objective. Fuel use is measured in gallons consumed, not MPG, so credits measured as MPG (or tenths of MPG, as in current law) result in lost savings whenever the credits are transferred from a fleet of higher fuel economy to a fleet of lower fuel economy.

For example, consider a fleet that gets 32.5 MPG rather than a standard of 27.5 MPG, earning a "credit" of 5 MPG. The correct way to value this added fuel economy is in terms of the fuel savings expected over the life of an average vehicle, e.g., over 100,000 miles of driving. Fuel use is given by dividing miles driven by MPG, so the fuel savings are

$$\frac{100{,}000 \text{ miles}}{27.5 \text{ MPG}} - \frac{100{,}000 \text{ miles}}{32.5 \text{ MPG}} = 3636 - 3077 \text{ gallons} = 559 \text{ gallons}$$

Now consider the effect of applying this 5 MPG credit to a fleet averaging 17.5 MPG, so that it is treated as if the rated mileage were 22.5 MPG. The excess consumption is

$$\frac{100{,}000 \text{ miles}}{17.5 \text{ MPG}} - \frac{100{,}000 \text{ miles}}{22.5 \text{ MPG}} = 5714 - 4444 \text{ gallons} = 1270 \text{ gallons}$$

The excess consumption of the lower mileage fleet is therefore more than double the savings of the higher mileage fleet, resulting in a net excess consumption (lost savings) of 711 gallons.

In summary, if the purpose of a CAFE credit scheme is to provide flexibility rather than a way to compromise oil savings, the credit system must be based on gallons saved (or wasted) rather than differences in MPG. The number of miles used as the basis of the calculation is immaterial as long as it is consistent. If one wanted to measure credits in a smaller numerical unit, then a smaller distance can be used for the calculation. For example, using a 1,000 mile basis, to offset the difference between 17.5 MPG and 22.5 MPG would require 12.7 "credits" (for the energy purist, such a basis measures credits in "milligallons per mile"). The tradeoff will also work out correctly if CO_2 emissions (grams per mile) are used as the basis for measurement.

AUTOMOBILE SAFETY AND FUEL ECONOMY: A CRITIQUE OF "THE EFFECT OF FUEL ECONOMY STANDARDS ON AUTOMOBILE SAFETY*"

Marc Ledbetter
American Council for an Energy Efficient Economy

September, 1989

Many opponents of federal Corporate Average Fuel Economy Standards (CAFE) argue that the standards increase highway fatalities. In essence, they argue that fuel economy standards forced auto manufacturers to reduce vehicle weight, that traffic fatalities are higher in lighter cars, and therefore, that standards increase traffic fatalities.

Their argument is based largely on a recent paper by Robert Crandall and John Graham, which concludes that the CAFE standards will cause an additional 2,200 to 3,900 highway fatalities in 1989 model year cars over the next ten years. This paper's conclusion, however, is based on seriously flawed assumptions, out-of-date information on how automobile manufacturers improve automobile fuel economy, and misapplication of another study's results.

To estimate the increase in highway fatalities due to CAFE, Crandall and Graham constructed mathematical models that predict what average vehicle weight would have been in 1989 model year cars had CAFE standards not existed. These models assume that manufacturers seek to maximize the weight of their cars, but are constrained by expected future price increases in gasoline and steel. After estimating the weight reduction due to CAFE standards, they then used estimates of the relationship between vehicle weight and traffic fatalities to calculate the extra fatalities caused by the estimated weight reduction.

Errors in the Crandall/Graham Study

Study is Based on Out-Of-Date Technological Relationships

One of the most serious errors in the Crandall/Graham paper is the assumption that automobile technology is static -- that technology used to improve fuel economy in the 1970s is the same technology used to improve fuel economy in the 1980s. Crandall and Graham observed data on weight, gasoline prices, and steel prices between 1970 and 1977 to estimate the pre-CAFE, market-determined technological relationship between average vehicle weight and expected future gas and steel prices.[2]

---

* Robert W. Crandall and John D. Graham, "The Effect of Fuel Economy Standards on Automobile Safety," March 1988, Journal of Law and Economics, Vol. XXXII, pp. 97-118, April 1989.

Shortly after this period, projected gasoline prices fell, and the authors speculated that were it not for CAFE standards, auto manufacturers would have increased the weight of their cars according to the 1970 to 1981 relationship between weight and gas and steel prices. The authors estimated that, on the basis of the 1970-1977 relationship, average vehicle weight would have been about 500 pounds higher in 1989 model year cars had CAFE standards not existed.

Using weight/price data from the 1970s to project how cars would be built in the 1980s assumes that automobile technology hasn't changed since the 1970s. But technology has changed rapidly in the automobile industry, and this is especially true with regard to fuel economy technology. In the 1970s, weight reduction was one of the simplest and cheapest ways to improve fuel economy. After 1980, manufacturers substantially improved fuel economy without having to resort to weight reduction. This very important technological change is ignored by Crandall and Graham.

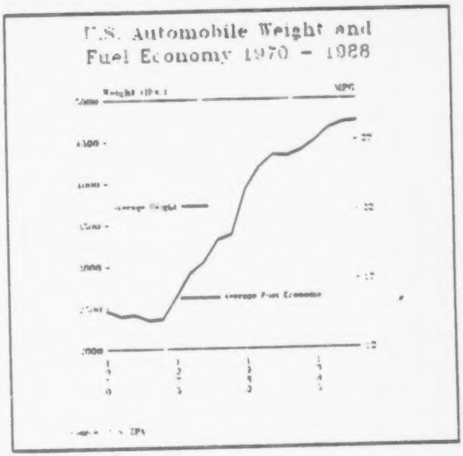


Figure 1

To understand how important this technological shift was, refer to Figure 1. It is a graph of U.S. average passenger car fuel economy and weight during the years 1970 to 1988. As can be seen, average vehicle weight fell sharply and average fuel economy rose correspondingly from 1976 to 1980. However, after 1980 manufacturers began improving fuel economy without reducing the weight of cars. After 1980, average vehicle weight has remained almost constant while fuel economy rose over 20%. Crandall and Graham used weight/price relationships from the 1970 to 1981 period to project how manufacturers would have responded to changes in fuel economy demand if CAFE standards didn't exist, but clearly, the data from this period reflect out-of-date technology. If manufacturers didn't have to reduce the weight of cars in the 1980s to meet CAFE standards, why, in the absence of CAFE standards, would manufacturers respond to lower expected gas prices by adding weight back into cars in proportion to the weight they took out of cars in the 1970s?

This problem is often encountered in econometric studies. It is very difficult to predict how sectors of the economy will respond to a hypothetical situation. When those predictions are based on the economic relationships and technology of another period, the predictions are on shaky grounds. When these economic relationships and technologies are clearly out-of-date, the predictions are meaningless.

An additional point about Crandall and Graham's use of automobile weight data bears discussion. The authors assume that CAFE standards had a strong effect on average vehicle weight. However, the record shows that vehicle weight was reduced in the early years of the CAFE program, when the standards were the least restrictive. Gasoline prices were relatively high during this period, so manufacturers had little difficulty exceeding the standards. But after 1982, when gasoline prices softened, manufacturers had difficulty meeting the standards. During this period, when CAFE standards were most restrictive, weight remained unchanged. If manufacturers chose not to reduce vehicle weight when, as a consequence of failing to meet the CAFE standards, they were threatened with hundreds of millions in fines, how can one argue that the CAFE standards strongly influence vehicle weight?

Manufacturers Don't Seek to Maximize Weight

Another serious problem with the Crandall/Graham study is the authors' assumption that vehicle manufacturers seek to maximize weight. This assumption is critical to the authors' conclusions because once the manufacturers reduced weight in response to rising gasoline and steel prices, the authors needed a way to explain why the CAFE-free market would have increased average vehicle weight once gasoline and steel prices softened.

This assumption conflicts strongly with the manufacturers' keen interest in improving vehicle acceleration. The heavier a car, the more slowly it accelerates. To make heavy cars accelerate as fast as light cars, manufacturers must use larger and more powerful engines, and stronger drivetrain parts to withstand additional power and torque, which of course is very expensive. Adding weight to a car therefore works against one of the major automobile design objectives.

An indication of how highly manufacturers rank the importance of improving vehicle acceleration can be found in a recent Arthur D. Little survey of the heads of engineering, research, and product planning in North America. The survey found that power/pickup was their number one priority in powertrain design, followed by, in order of priority, quality, noise/vibration/quietness, driveability/performance feel, exterior styling, and fuel economy.[2]

Figure 2 shows the trends in average vehicle 0 to 60 mph acceleration between 1978 and 1988. Between model years 1982 and 1988, average vehicle acceleration performance improved 14%. Had vehicles in model year 1989 been 500 pounds heavier, as estimated by Crandall and Graham, the improvement in acceleration performance since 1982 would have been cut by about 90% -- unless, of course, manufacturers had spent a great deal of money putting larger and more powerful drivetrains into these cars.[4] Given the tradeoff between vehicle weight and acceleration, and the obvious importance manufacturers assign to acceleration performance, the assumption that manufacturers seek to maximize a vehicle's weight has little relation to reality.

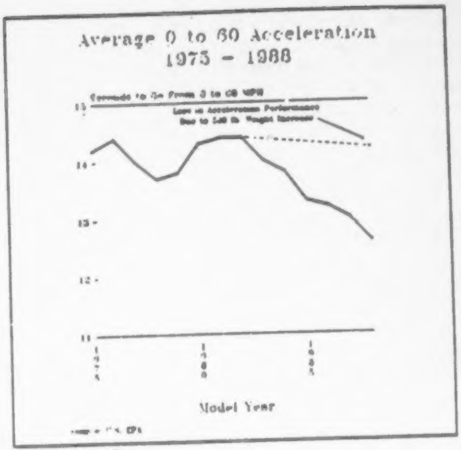


Figure 2

Crandall and Graham Misapplied Results of Safety Study

Once Crandall and Graham estimated how much more cars would have weighed had the CAFE program not existed, they used estimates of the relationship between vehicle weight and traffic fatalities to estimate how many additional deaths will be caused by the CAFE-induced weight reduction. The relationships between vehicle weight and traffic fatalities were taken from studies on the relationship between car size and auto safety done by Leonard Evans of the General Motors Research Laboratories Transportation Research Department.[5] Since car size and weight are strongly related, Evans used car weight to characterize car size in his studies. He found a strong negative correlation between car weight and traffic fatalities.

In order for Evans' relationships between car weight and fatalities to be useful in the Crandall/Graham study, Crandall and Graham had to assume that variations in car weight, not car size, caused Evans' observed differences in fatality rates, i.e., that weight is the causative factor. This assumption is critical to their argument that CAFE forced weight reductions, that weight reductions cause increased fatalities, and therefore, that CAFE standards cause increased fatalities. Had they not assumed that weight is the causative factor, they could not link traffic fatalities to fuel economy and CAFE standards.

In assuming that changes in car weight cause changes in fatalities, Crandall and Graham ignored an important caveat Evans placed in the introduction to his paper. Evans states,

> In all cases, we characterize car size by the physical variable mass as measured by the curb mass [weight] of the car. We then determine relation between probable driver death (or injury) and car mass. Such relations do not imply that car mass, as such, is the causative factor. Clearly, a wide variety of vehicular characteristics are strongly correlated with car mass (e.g., wheelbase, track, size in general, hood length, trunk size, engine displacement, etc.).

Clearly, Crandall and Graham used Evans' study results in a manner he explicitly warned against. Crandall and Graham have taken Evans' study results, and forced them to fit into a framework that ties highway fatalities to CAFE standards.

But one might ask, if weight and car size are strongly correlated, what is the difference? The record shows the difference. Although car weight dropped off significantly in the late 1970s and early 1980s, car size, as measured by interior volume, has remained almost constant since 1978, the year CAFE standards first took effect. See Figure 3. Thus, in looking at changes over time, there is a big difference between car size and weight.

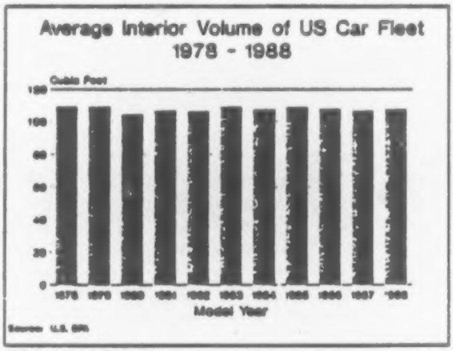


Figure 3

Evans' studies provide the basis for further research into why people in larger cars fare better in crashes. Is it because large cars have more "crush space" that can absorb energy in crashes, and thereby decelerate their occupants more slowly? Or do larger cars better prevent deformation of interior space during crashes? Whatever the cause, further research may provide clues to the answer. In the meantime, there is no basis for assuming weight is the cause.

Fuel-Efficient Cars Can Be Safe

A large number of options for improving automobile fuel economy exist, only one of which is reducing vehicle weight. Fuel economy increases achieved through changes such as transmission improvements, fuel injection, multi-valve engines, or turbocharging have little or nothing to do with auto safety. On the other hand, the primary determinants of auto safety are design features such as occupant restraint systems, air bags, and the ability of a car to absorb energy. Simply put, automobile safety is a matter of design, not fuel economy.

Government Crash Tests

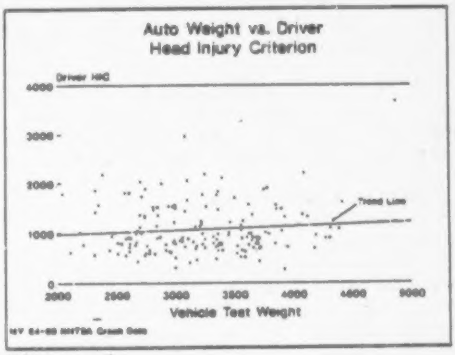


Figure 4

Points in Figures 4 and 5 represents the weight and safety performance of a 1984 to 1988 model year car crash tested by the U.S. Department of Transportation's National Highway Traffic Safety Administration. These cars were crashed into a fixed barrier at 35 mph. The measure of safety performance is the head injury criterion, which reflects the potential for injury to the brain. A head injury criterion of 1000 or higher means a vehicle occupant would probably be killed or very seriously injured. The trend lines in the graph reflect the strength of the relationship between the HIC and vehicle test weight. Flat or low-sloped trend lines, as shown here, indicate there is no relationship between automobile weight and head injury criteria. In fact, there are some heavy vehicles that perform poorly (upper right portion of figures) and some light vehicles that perform very well (lower left portion of figures).

Crashing a car into a fixed barrier does not fully measure how weight affects a car's crash performance. Nonetheless, the figures illustrate that there are large differences in the crash worthiness of automobiles, independent of weight. A 1982 study by the Office of Technology Assessment pointed out that the differences in crash performance within weight classes were greater than the differences among weight classes. OTA concluded that "relatively minor" design changes could "overwhelm" the crash performance differences caused by size.[5]

EXAMPLES OF FUEL-EFFICIENT, SAFE CARS

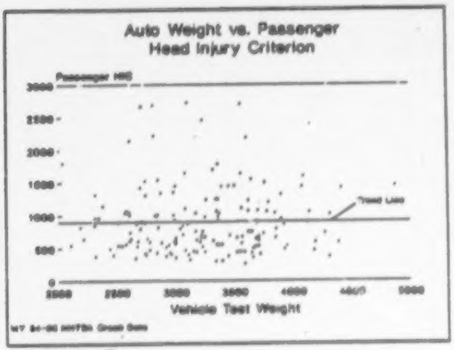


Figure 5

As seen above, there are many existing light-weight cars that perform well in crash tests. But much safer and much more fuel-efficient cars are possible. The Volvo LCP 2000, a prototype high-efficiency car, was designed with both safety and fuel economy in mind. The car weighs 1500 pounds (less than half today's current average auto weight of 3100 pounds), achieves 63 mpg in the city and 81 on the highway, and can withstand frontal and side impacts of 35 mph, and a rear impact of 30 mph.[7] U.S. regulations require only that vehicles can withstand a frontal impact of 30 mph.

The U.S. Department of Transportation's Research Safety Vehicle Program, which existed from 1977-1980, developed an experimental car that was both safe and fuel efficient. The program concluded that a car using then-current technology (ten years old now) could carry five passengers; achieve 43 mpg; and withstand 80 mph frontal impacts, 50 mph side impacts, and 45 mph rear impacts.[8]

Conclusion

It is clearly incorrect to assume, as did Crandall and Graham, that weight reduction continues to be the primary means by which manufacturers improve fuel economy, and that the technological response to gasoline prices in the late 1980s would be the same as in the 1970s if CAFE standards didn't exist. Crandall and Graham's prediction that average automobile weight in model year 1989 would have been 500 pounds higher in the absence of CAFE standards is based on out-of-date technological relationships. It assumes that manufacturers would have been willing to either substantially reduce the acceleration performance of their cars, or invest a great deal of money in developing and installing more powerful drivetrains to improve the acceleration performance of much heavier cars. Furthermore, their estimate of additional traffic fatalities caused by CAFE standards is based upon misapplication of another study's results. A series of errors as significant as each of these renders the results of their paper unreliable.

More responsible studies on the issue have been completed. A recent study by the National Highway Traffic Safety

Administration establishes a relationship between vehicle weight and fatality rates in single vehicle nonrollover accidents.[9] Another study by the Insurance Highway Safety Institute finds a relationship between car size and fatalities. These studies have provided important, but inconclusive results. More research needs to be done to separate out the effects of driver behavior, types of crashes, and the propensity for different sizes of cars to be involved in a crash. More research also needs to be done on what design features cause large cars to have lower fatality rates, i.e., do large cars perform better because they are heavier, or because they have more energy-absorbing "crush space"?

If new research indicates that weight is the primary cause of lower fatalities rates in large vehicles, then future fuel economy improvements should be based on approaches other than weight reduction. If new research indicates that car size, such as interior volume or wheelbase, is the primary cause, then future fuel economy improvements should focus on measures that do not decrease car size. With either approach, current and future technologies provide a broad range of ways to substantially improve auto fuel economy while simultaneously improving auto safety. Simply put, automobile safety is a matter of design, not fuel economy.

Notes and References

1. See, for example, comments submitted to the National Highway Traffic Safety Administration by the Competitive Enterprise Institute, Docket No. FE-88-01, in the matter of Passenger Automobile Fuel Economy Standards for Model Year 1989; also see testimony submitted by Ford and General Motors to the U.S. Senate, Committee on Commerce, Science and Transportation, Consumer Subcommittee, hearing on Global Warming and CAFE Standards, May 2, 1989.

2. The CAFE standards became law in 1975 and first took effect in 1978.

3. *Automotive News*, May 15, 1989, p. E30.

4. EPA estimates the relationship between vehicle weight and acceleration performance to be:

   $T = F\ (HP/WT)^{-f}$
   where,
   HP = horsepower
   WT = inertia weight
   and F and f are:

	Transmission Type	
	Auto	Manual
F	.892	.967
f	.805	.775

   See, R.M. Heavenrich, J.D. Murrell, and J.P. Cheng, "Light Duty Automotive Trends Through 1986," Society of Automotive Engineers Technical Paper Series, #860366, 1986.

5. Evans, Leonard, "Car Size and Safety: Results from Analyzing U.S. Accident Data," Proceedings from the Tenth International Technical Conference on Experimental Safety Vehicles, Oxford, England, July 1-4, 1985.

6. Office of Technology Assessment, U.S. Congress, *Increased Automobile Fuel Efficiency and Synthetic Fuels*, September 1982.

7. Bleviss, Deborah L., *The New Oil Crisis and Fuel Economy Technologies: Preparing the Light Transportation Industry for the 1990s*, (Westport, CT: Quorum Books, 1988), p. 118.

8. U.S. Department of Transportation, *The Safe, Fuel-Efficient Car: A Report on its Producibility and Marketing*, October, 1980.

9. Partyka, S. and Boehly, W., "Passenger Car Weight and Injury Severity in Single Vehicle Nonrollover Crashes," National Highway Safety Administration, U.S. Department of Transportation, 1989.

Oral Testimony Before the Subcommittee of the Consumer of the U.S. Senate Committee on Commerce, Science, and Transportation.

April 10, 1991, 9:30 a.m.

My name is J. Daniel Khazzoom. I am a Professor of Quantitative Studies at San Jose State University. I received the Ph.D. in Economics from Harvard and did my post-doctorate work in Mathematics at Harvard, as well. I taught at Cornell, N.Y.U., McGill, Stanford and the University of California at Berkeley. I served as Chief Econometrician of the Federal Power Commission while on leave of absence from McGill between 1968-70.

My research is primarily in the area of energy modeling and related fields, particularly fuel economy, conservation and supply. Over the last two years or so my research results appeared in the Journal of Policy Analysis and Management; Energy Policy; the Journal of Econometrics; and the Energy Journal.

The purpose of my testimony is to comment on two recent models that generated interest in the current debate on CAFE and safety, and conclude with a thought on the current debate.

I. The Crandall-Graham Model.

The first model is the Crandall and Graham model published some two years ago. It estimates that because of CAFE, the car's average weight has dropped by 14% and as a result, single vehicle highway fatalities have increased by 14 to 28 percent [pg. 115].

The model from which the authors derive these estimates contains numerous results that do not square with reality. They show that alcohol consumption has no significant effect on highway fatalities; the percent of drivers in the 15-25 years age bracket has no significant effect on highway fatalities; speed has no significant effect on highway fatalities. These estimates conflict with all available evidence on the role of these factors in highway deaths. A model with such results cannot be used. The interrelationship among the variables in a model means that infirmities in one part will, in general, echo in the results of the other parts of the model. Hence, there is no reason to assume that the other estimates the model contains and that may look reasonable can be indeed trusted. A model is one integral entity. It cannot be compartmentalized. One simply cannot pick and choose -- choose those parts of the model that look appealing and close one's eyes to what does not make sense in the same model. In addition, because the model omits important explanatory variables, its estimates exaggerate the effect of CAFE on car weight, as well as the effect of car weight on highway fatalities. I would not use this model in policy making. Public policy is entitled to more than that.

II. The IIHS Model

Very similar remarks apply to the second model, which was developed by the IIHS, and published last September as an Institute Status Report. The Institute reports that as the MPG goes up one mile, the death rate goes up by 3.9%. Regrettably, the Institute chose to follow a pick and choose procedure in using the results of this model -- ignoring the estimates of their model that make no sense and calling attention to the estimate for the MPG variable only. Moreover, the Institute's model is far behind on meeting minimum standards. Its adjusted explanatory power is incredibly poor, accounting for only 21% of the variations in the death rate. It is ironic that the Institute treats a model with such a low explanatory power as a revelation of the truth. Says the Institute, "*What is true is this: a relationship exists between death rate and fuel use...*"[1]. Even this meager accomplishment turned out to be based primarily on outliers i.e., on the extreme cases among the observations. When I applied robustness tests to the Institutes' model, it fell apart. I took out just two outliers, and the adjusted explanatory power of the model sunk to 8.5%. In another robustness test I did, the results were so bad that the adjusted explanatory power of the model dropped to minus 14%, which means the model not only contributes nothing to an understanding of the death rate, but is actually counterproductive to use.

III. A CLOSING THOUGHT

Finally, let me share with you the following thought.

Although the debate about safety is cast in the context of CAFE, it really is concerned more with fuel economy and the desirability of increased fuel economy as a policy goal. If CAFE kills, it does so by increasing the fuel efficiency, which is also what the gas guzzler tax does, what the gasoline tax does and what the higher price of gasoline does. Crandall and Graham and similarly the IIHS argue that the decline in fatalities would have been more dramatic had CAFE not been in effect[2]. But if CAFE is to be rolled back or if it is to be repealed in order to reduce fatalities, why stop with CAFE? Perhaps roll back the gas guzzler tax, repeal the gasoline tax, and subsidize the consumption of gasoline to reduce the incentive to switch to fuel efficient vehicles. Then the highway death rate would be lower than today's. That would have been an achievement, but the question is: What is the opportunity cost?

What is at stake is an additional balance of payment deficit of $15 to $18 billion annually, increased U.S. vulnerability to OPEC's whims, and increased cost of coping with the impact on global climate.

---

[1] IIHS, Status Report, September 10, 1990, p.4

[2] CG, op.cit p.112 and letter of Brian O'Neill, President IIHS, to Senator Bryan, Feb. 22, 1991, p.4.

This is not an argument for CAFE or for any one specific measure in preference for another to enhance the fuel efficiency. It is an argument for keeping in focus the opportunity cost of doing away with, or freezing the measures that enhance fuel economy -- be it CAFE, gas guzzler tax, and gasoline tax. Society will be short changing itself if it chooses to focus only on the benefit of abolishing, trimming down or freezing these measures while ignoring what it has to forfeit in the process.

Because of the stakes involved, an alternative to targeting CAFE deserves to be explored. We need to explore perhapsa a two-pronged approach: (1) Encourage increased fuel economy and (2) simultaneously pursue cost-effective remedial measures that offset or more than offset the adverse effect of increased fuel economy on safety.

SUPPLEMENTAL MATERIAL FOR THE TESTIMONY OF J. DANIEL KHAZZOOM

BEFORE THE

CONSUMER SUBCOMMITTEE
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

APRIL 10, 1991

The IIHS' Estimated Relationship Between Fuel Economy and Death Rate

J. Daniel Khazzoom

General Comments

In its September 10, 1990 Status Report, IIHS shows a scatter diagram (reproduced here as Figure 1) of the death rate and MPG for four-door 1985-1987 year models, and draws a positively sloped curve intended to summarize the relationship between MPG and the death rate. Letting

DR = Death rate per 10,000 registered passenger vehicles
MPG = Miles per gallon
FEM = Percent of female drivers
OLD = Percent of drivers over 30 years old

IIHS estimated a relationship of the form

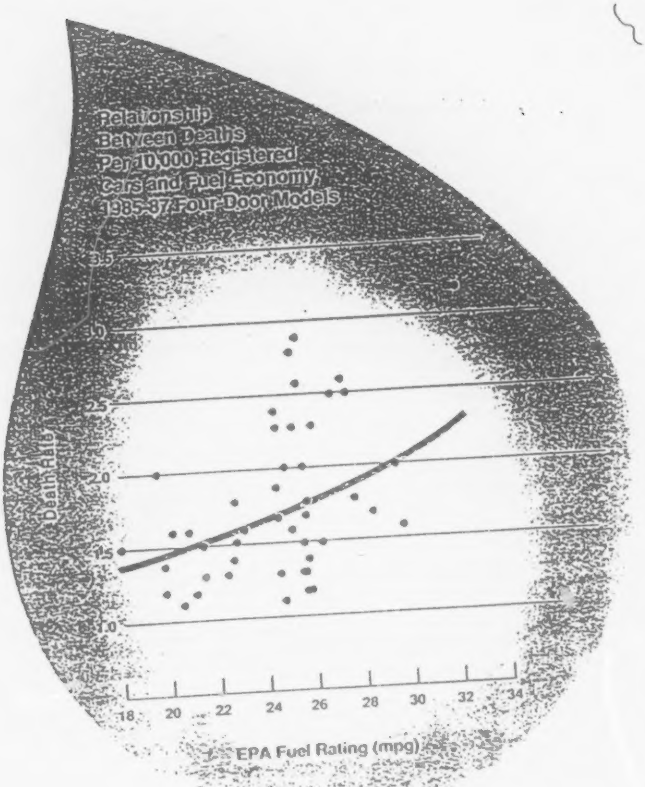
$$\ln DR = \alpha_0 + \alpha_1 MPG + \alpha_2 \ln FEM + \alpha_3 \ln OLD \qquad (1)$$

where ln denotes natural logarithm. (1) was fitted to a sample of data consisting of 47 four-door 1985-87 year models. The coefficient of MPG was estimated at .039 (t=2.11). In a stable, well estimated relationship, this indicates that a one mile per gallon increase in the fuel economy leads to a 3.9% increase in the death rate. The coefficients of FEM and OLD are not significant (t's are 1.23 and .19, respectively). Altogether 26% of the variation of the logarithm of the death rate is explained by the above model.

There are several problems with the equation IIHS estimated. Let me briefly summarize them.

1) The form of (1) is very unusual. The dependent variable as well as two of the independent variables appear in logarithmic form, one explanatory variable, however, appears in natural number form. The logic behind this formulation is not evident. IIHS provides no documentation at all for their model.

A Reproduction of IIHS Scatter Diagram of the Death Rate and Fuel Economy



2) The estimates are contemporaneous as they are derived from cross sectional observations. But contemporaneous estimates need not have, and in general do not have a direct bearing on intertemporal relationship. Yet the question of the impact of increased fuel economy on safety is essentially an intertemporal question.

3) The model specification is very sketchy. Clearly important explanatory variables are missing. This is evident from the extremely low R^2 of .26 IIHS derives for the equation. (The adjusted R^2 is .21).

4) Three variables are included in the model: MPG, % drivers above 30 years of age and % female drivers. However, the model's estimates show the age and sex have no significant effect on fatalities. This conflicts with the available evidence on these two factors. Even if one ignores the important question of statistical significance of the estimates, the sign of the sex variables becomes a problem: positive instead of negative.

The Institute follows a pick and choose procedure in using the results of the model -- ignoring the estimates that conflict with reality and calling attention only to the MPG variable.

Even if we ignore the pick and choose aspect of the IIHS procedure[1], it is ironic that the Institute should use a model with such a low explanatory power and treat it as a revelation of the truth. "*What is true is this: a relationship exists between death rate and fuel use...*"[2]

Let me try to put in perspective what IIHS has done.

Two candidates A and B are running for an office. A poll is taken. 12% of those surveyed say they will vote for A; 9% say they will vote for B. 79% are undecided. Oblivious to the overwhelming uncertainty over the undecided bloc, the pollster declares A has won the election.

---

[1] IIHS singles out MPG and ignores the fact that the other two variables in the model are, contrary to IIHS' expectations, statistically insignificant.

[2] IIHS, Status Report, September 10, 1990, p.4

IIHS uses an equation that fails to account for 79% of the variations in the logarithm of the dependent variable. This means the model's estimates can very well be very far from the truth. Nonetheless, IIHS declares the MPG the villain of the piece.

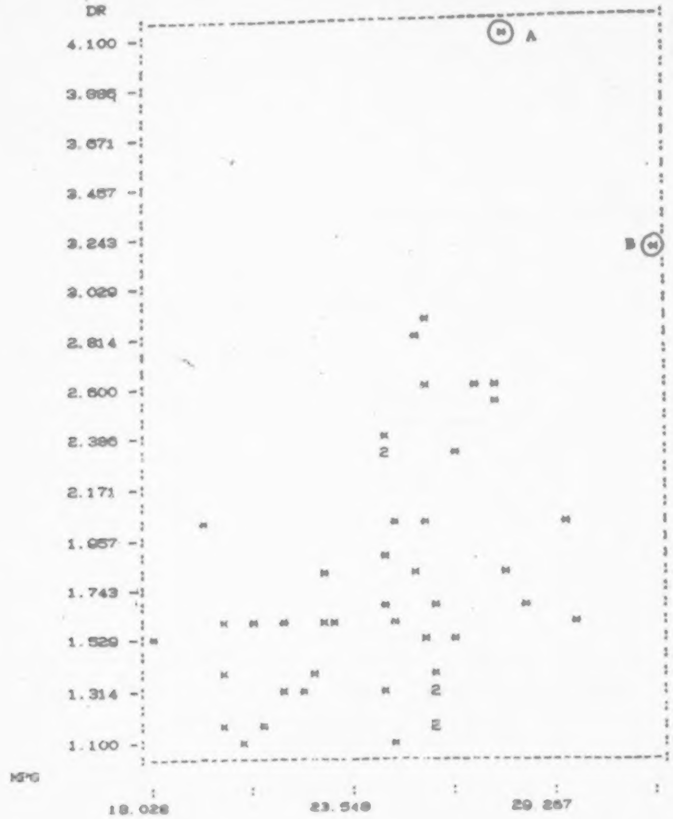
As it is, (1) omits several major variables. Ordinarily, when these variables are incorporated in the equation, the parameters of (1) will change, perhaps drastically, unless the omitted variables happen to be orthogonal to the ones presently included in (1).

5) Look at the scatter diagram of the death rate and MPG shown in Figure 2. We constructed this diagram from the data sent to us by the IIHS. The diagram shows a clearly identifiable clustering. Moreover, IIHS' estimates appear to be dominated by outliers, that is, by extreme observations. In general, the outliers can distort the results seriously, because by its very nature, least-squares procedure used in estimation gives a disproportionate weight to the outliers. An outlier which is 4 times as distant from the expected value (average) as another observation will be accorded a weight sixteen times as large as the weight placed on the other observations in determining the least-squares estimate.

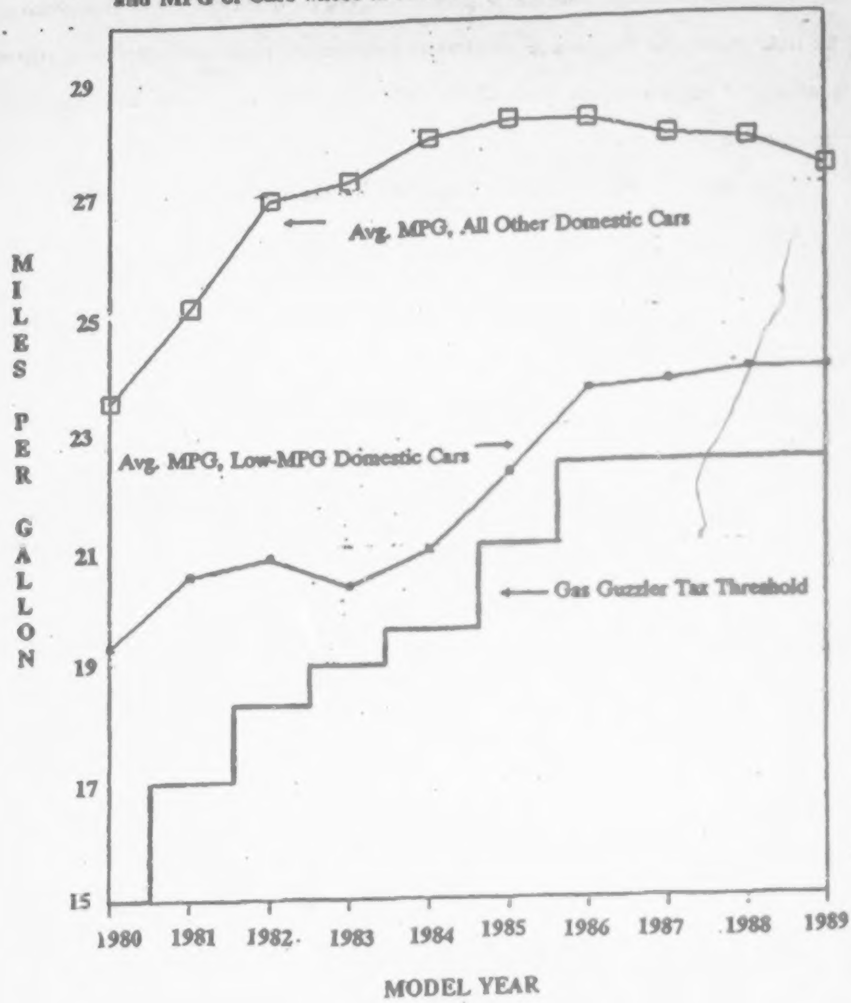
The remainder of this section focuses on this outlier problem. It demonstrates that the reported regression results are not robust at all. Coupled with the extremely poor explanatory power of the model this indicates no conclusion of the form " *more fuel efficient cars have greater fatalities*" can be drawn from the IIHS estimates.

Table 1 lists the data that were used in the analysis. Table 2 contains some descriptive statistics for the variables used in the regression equation. Comparing these to the descriptive statistics for the original data transmitted to us by IIHS shows that the data used here differ slightly from the ones used in the original paper (part of the reason for the difference may be in the decimal rounding of the data given to us). A similar conclusion can be drawn from the regression results we derived in our attempt to duplicate the original model (see Model 1 in Table 3) The results are very similar. The explanatory power is about the same. There are some differences in parameter estimates. Our estimate for the parameter of the death rate is .041 as opposed to .039 for IIHS' model, but the message about which variables are significant is the same. Given the similarity of our results with those of the IIHS, we proceed to use our data to examine the robustness of IIHS' estimates.

Figure 2: Plot of the Death Rate (DR) Against the Fuel Economy (MPG)



Threshold of Gas Guzzler Tax, MPG of Cars Whose 1980 MGP Was Below 21 and MPG of Cars whose 1980 MPG exceeded 21:



Frequency Distribution of Passenger Car Weight by Market Share, 1978-1987

Weight	Market Share		Change in Market Share	
	1978 Col 1	1987 Col 2	Col 3 = Col 2-Col 1	Col 4 = Col 3 as % of Col 1
Under 2250 lbs	.024	.007	-.017	-70.8%
2250	.079	.046	-.033	-41.7%
2500	.070	.164	+.094	+234.3%
2750	.045	.190	+.145	+322.2%
3000	.081	.233	+.152	+187.7%
3500	.268	.246	-.022	-8.2%
4000	.200	.104	-.096	-48.0%
Over 4000	.233	.010	-.223	-95.7%
Average Weight: $\overline{X}$	3537.6	3069.1	-468.5	-13.3%
Standard Deviation: s	284.7	196.6	-88.1	-30.9%
Coefficient of Variation: $\frac{s}{\overline{X}}$	.080	.064		

Compiled from R.M. Heavenrich, J.D. Murrell and J.P Chang (1987) Light Duty Automotive Fuel Economy and Technology Trends Through 1987 (Washington D.C. USEPA)

CG's Estimates of the Fatalities Submodel.

Variable	Occupant Death Rate	Total Death Rate
CONSTANT	17.7 (3.21)	25.2 (4.39)
SAFETY	2.10 (9.78)	1.78 (7.09)
WEIGHT	-2.30 (3.74)	-2.97 (4.61)
INCOME	.35 (3.39)	.60 (2.28)
YOUTH	-.17 (.77)	.33 (1.45)
ALCOHOL	-.19 (.41)	.01 (.02)
TRUCKS	.68 (5.15)	.36 (2.56)
SPEED	.46 (1.21)	.07 (.17)
COST	.25 (1.59)	.30 (1.61)
LIMITED ACCESS	-.11 (6.54)	-.12 (6.60)
$\bar{R}^2$	.90	.99

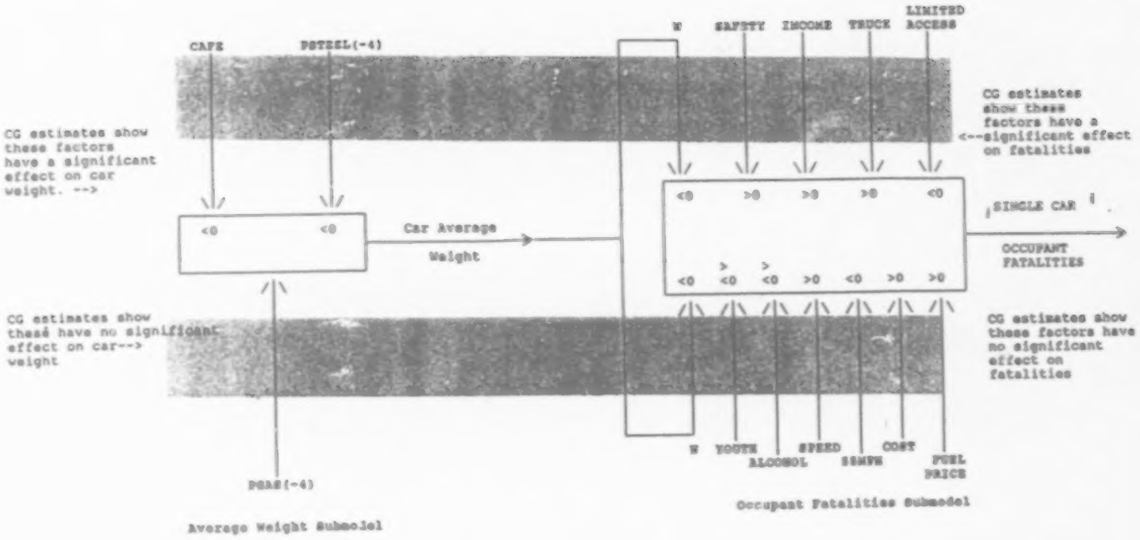
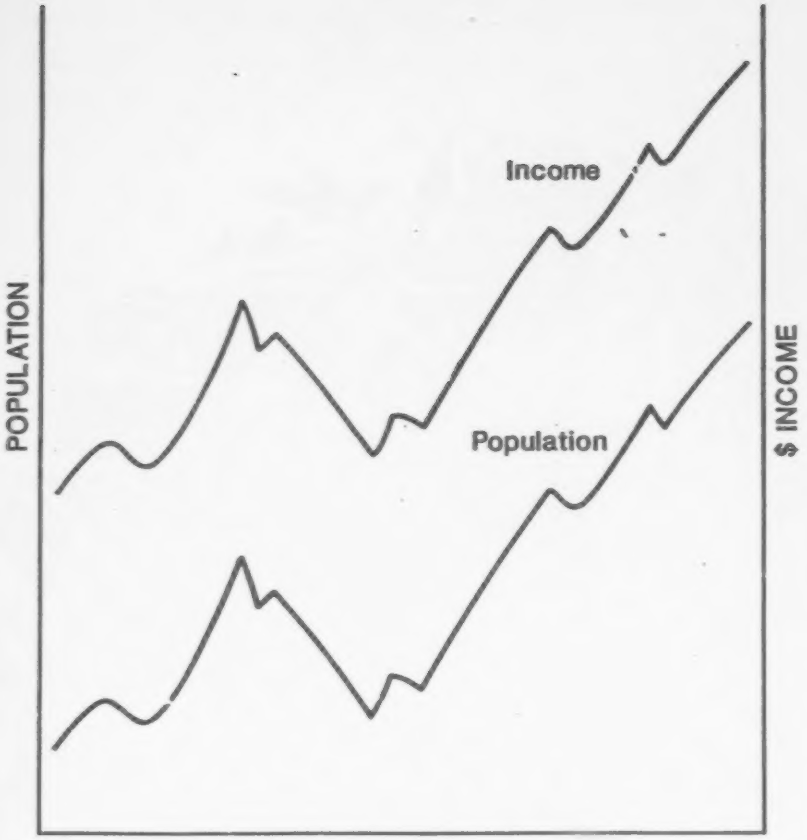

CAFE
PSTEEL(-4)
CG estimates show these factors have a significant effect on car weight. -->
<0
<0
Car Average Weight
CG estimates show these have no significant effect on car--> weight
PGAS(-4)
Average Weight Submodel
W
SAFETY
INCOME
TRUCK
LIMITED ACCESS
CG estimates show these factors have a <--significant effect on fatalities
<0
>0
>0
>0
<0
SINGLE CAR
OCCUPANT FATALITIES
<0
>
<0
>
<0
>0
<0
>0
>0
CG estimates show these factors have no significant effect on fatalities
W
YOUTH
ALCOHOL
SPEED
SSMPH
COST
FUEL PRICE
Occupant Fatalities Submodel

Figure 1. AN ARROW DIAGRAM OF THE CRANDALL-GRAHAM MODEL.

Demand for A = 1 * INCOME + 2 * POPULATION

Demand for A = 3 * INCOME

Demand for A = 3 * POPULATION



An Illustration of a Case of Exact Multicollinearity.

Table 1: **Data on the Death Rate, Fuel Economy, Percentage of Male Drivers and Percentage of drivers under 30 years used in the estimation of IIHS model.**

DR	MPG	MALE	YOUNG
1.2	19.954	77	1
1.3	21.695	63	7
1.4	19.954	77	9
1.5	18.028	50	6
1.6	22.754	58	4
1.6	21.695	64	11
1.6	20.064	74	7
1.8	22.754	67	2
1.1	20.628	66	20
1.2	25.847	59	10
1.2	21.059	78	4
1.2	25.969	66	17
1.3	25.847	51	12
1.3	24.594	51	17
1.3	22.286	76	15
1.3	25.847	62	24
1.4	22.481	78	13
1.4	25.969	73	9
1.5	26.374	80	19
1.6	24.889	56	25
1.6	20.966	55	2
1.6	23.050	59	6
1.7	24.594	38	10
1.7	25.847	56	12
1.8	25.225	56	13
1.9	24.594	58	28
2.0	19.334	69	30
2.3	26.374	50	26
2.3	24.594	64	11
2.4	24.594	61	6
2.6	26.940	68	21
2.6	25.561	56	4
2.9	25.561	68	10
1.1	24.643	51	33
1.5	25.561	59	19
1.6	29.797	54	31
1.7	28.535	61	34
1.8	27.730	70	26
2.0	29.669	48	25
2.0	24.852	77	14
2.0	25.665	52	15
2.3	24.436	56	27
2.5	27.531	55	19
2.6	27.441	62	30
2.8	25.438	53	29
3.2	32.077	48	37
4.1	27.821	46	21

Table 2: Summary Statistics for the Variables Used in Estimating the IIHS Model

VAR	MEAN	STD DEV	MINIMUM	MAXIMUM	SUM	VARIABLES
DR	1.83830	0.62225	1.10000	4.10000	86.40000	0.38720
MPG	24.61953	2.94866	18.02800	32.07700	1157.11800	8.59459
FEM	-0.98324	0.28276	-1.50944	-0.47804	-46.21214	0.07995
OLD	-0.18619	0.12091	-0.46204	-0.01005	-8.75108	0.01452

Robustness Results

As I indicated earlier, there are some visual outliers in the data set. These can be seen in Figure 2. Note, in particular, two outliers for cars with extremely high death rates of 4.2 and 3.1. These outliers are marked A and B respectively in the plot. Models 2 and 3 explore the effect of these outliers on the parameter estimates. Model 2 contains 46 of the original 47 observations -- only the observation with a death rate of 4.2 (outlier A) is taken out. Model 3 estimates the original equation with the two outliers A & B taken out.

The main message from this brief robustness exercise is that the exclusion of only 1 to 2 outliers (which is less than 5% of the total observations) can change the results drastically.

Model (2) of Table 3 shows that when outlier A is dropped, the parameter estimate for the death rate drops but remains statistically significant. However, the $\overline{R}^2$ drops from .191 to .158. When the two outliers A and B are dropped, the estimate of the MPG parameter drops to insignificance, and the model now explains only 8.5% of the variation in *ln DR*.

Table ~~3~~2. A List of the Equations Estimated to Evaluate the Robustness of IIHS' Model

	Constant	MPG	ln (FEM)	ln (OLD)	$\bar{R}^2$	Observation Omitted
Model 1	-2.9493 (-0.620)	0.0419 (2.367)	0.1789 (1.144)	0.0038 (0.009)	0.191	
Model 2	-0.2588 (-0.580)	0.0371 (2.222)	0.1218 (0.821)	-0.0518 (-0.133)	0.158	death rate 4.1
Model 3	-0.1397 (-0.308)	0.0323 (1.895)	0.1165 (0.789)	0.0223 (0.057)	0.085	death rate 4.1, 3.2
Model 4	-2.0806 (-1.322)	0.1149 (1.823)	0.2123 (0.847)	0.2124 (0.325)	0.022	MPG >28.5 MPG < 23.5
Model 5	1.0649 (0.428)	-0.0180 (-0.180)	-0.0332 (-0.122)	0.3012 (0.442)	-0.136	MPG > 27.4 MPG < 23.5

There is another way to see the severe limitations of the IIHS model. Another look at Figure 2 shows that there is a center range of the MPG (roughly between 23 and 29) where the death rate varies over its whole range. For a typical linear regression the rule of thumb is that the predictive power of the model is best around the mean of the explanatory variable. The reverse of this argument is typically used when people try to use a linear regression to forecast outside the range of explanatory variables in the sample. Models 4 and 5 in Table 3 show what happens when only the central range is used for the estimation of the model. Model 4 uses only the observations with an MPG between 23.5 and 28.5 and Model 5 uses only the observations with an MPG between 23.5 and 27.4. The estimates for Model 4 are based on 28 observations; in Model 5, 24 observations are used, which is still more than half of the original sample. The results are awful. Model 5 produces a negative and insignificant estimate for the relevant coefficient and a negative $\bar{R}^2$. Model 4, on the other hand produces an extremely high positive (but still statistically insignificant) coefficient for the MPG. (Model 4 explains 2.2% of the variations in *ln DR*). Yet the two models 4 and 5 differ by only 4 observations.

It could be argued that these results could be anticipated and are not fair because a relatively narrow range is chosen for the explanatory variable. This is true. The results should not be taken as serious regression results. They are only presented to illustrate the point that the relationship between the fuel economy and the death rate is modeled in much too crude a way to be taken seriously.

Institute of Scrap
Recycling
Industries, Inc.

1627 K Street, NW
Washington, DC 20006-1704
(202) 466-4050

TWX: 710 822 9782
EasyLink: 620 23427
FAX: (202) 775-9109

STATEMENT

The Institute of Scrap Recycling Industries, Inc.

Regarding

Fuel Economy and the Recycling of Automobiles

Presented to

The Committee on Energy and Natural Resources

United States Senate

Institute of Scrap Recycling Industries, Inc.

1627 K Street, NW
Washington, DC 20006-1704
(202) 466-4050

TWX: 710 822 9782
EasyLink: 620 23427
FAX: (202) 775 9109

The Institute of Scrap Recycling Industries, Inc. (ISRI), is pleased to have this opportunity to discuss the impact on scrap automobile recovery of legislation to increase Corporate Average Fuel Economy standards. ISRI is the trade association representing recyclers -- processors, brokers and consumers -- of metal, paper, glass, plastic and textiles. Our 1,800 member companies, doing business at over 5,000 recycling locations, return over 90 million tons of recovered materials to the economic mainstream each and every year. Of the 90 million tons in total, ISRI members handle approximately 60 million tons of iron and steel annually -- the single largest source being obsolete automobiles.

Automobiles are recycled at a very high rate; last year, our members recovered over 9 million auto hulks. Our members purchase these hulks either directly from the public, or after an auto dismantler recovers those parts which can economically be reused. The hulks are generally then fed into an auto shredder -- a large powerful hammermill -- which reduces the hulk to fist-sized pieces of metal, classifying the ferrous portion by magnetic separation. The non-ferrous fraction, e.g., aluminum, copper, is recovered by various additional separaton procedures. The plastic, rubber, fabric, glass and dirt in a car comes out as a processing waste, known as auto shredder residue (ASR), or fluff, for which land disposal is the only present option. In many sections of the country, the cost of disposal of recycling residues is already approaching the value of the recovered material.

We are concerned that rapid increases in auto fuel efficiency, without attention to automobile recovery, could make it difficult or impossible to recover most if not all automobiles, as is accomplished today. As a result, millions of cars a year could simply pile up in urban areas and by rural roadsides. Many millions of tons of waste would be added to the annual waste stream of the United States.

S. 279, for example, would mandate a 40 percent increase in auto fuel efficiency standards. It is clear that auto manufacturers may elect to meet the standards by substituting non-recoverable, non-metallics for recoverable metals in automobiles. At present, none of the non-metallics used in automobiles are being recycled, and there is no technology currently available or economically viable even on the horizon. Plastics recycling efforts notwithstanding, the amount of plastics in fluff is growing because the success with plastic recycling has not addressed the multitude of resins mixed in the fluff. While each particular resin used in these plastic parts may be recyclable if uncontaminated with other resins on other materials in the auto, the shredding process produces a heterogeneous mixture of resins that cannot today be productively reclaimed.

According to the American Metal Market, U.S. automobile manufacturers are projected to consume 2.2 billion pounds of plastic by 1995 without any major alterations to current design standards. Efforts are underway to explore this problem, but for now and the forseeable future, composites, plastics and the other non-metallics end up as shredder fluff, for which disposal is the only option.

It is a fact that land disposal costs are increasing exponentially. As the cost of disposal rises, without concomitant increases in the value of recovered materials, many automobile recyclers could be driven from the field even if the current composition of motor vehicles does not change. If the non-recoverable percentage of an automobile should increase significantly or it should assume a toxic characteristic, e.g., as a result of cadmium usage, the recycling industry will be quickly faced with disposal costs which exceed the value of the recyclable fraction of the hulk.

In the past, recyclability has not been a design requirement. Now it is essential for us to make it a requirement. If we fail to do so, all efforts to encourage recycling will amount to little.

Design for Recycling (TM) is a concept we strongly urge the Committee to consider. The objective is to convince manufacturers not to use toxic or non-recyclable materials unless there is no economic alternative. The benefits are the reduction of the volume of material requiring hazardous waste disposal and the minimization of non-recyclable solid waste requiring disposal. Manufacturers must ensure that consumer products can be safely and economically recycled, using currently available recycling techniques. However, manufacturers should not be asked to bear all the costs of Design for Recycling (TM), any more than recyclers should be required to continue to bear all the environmental risks of recycling in the absence of appropriate product design. But, unless there are compelling reasons to the contrary, consumer products should be designed in such a fashion that economic recycling of them is practical, without creating risks to human health or the environment.

ISRI believes that Design for Recycling (TM) is the only long-term alternative to the current disposal crisis. If our society fails to make fully recyclable products, it will never achieve its recycling goals. The short-term solution to the difficulties which could be posed by rapidly increased Corporate Average Fuel Economy Standards would be to ensure, to the maximum extent possible, that such standards are met through the use of materials which can and will be recovered under today's technology.

In closing, Mr. Chairman, we understand and respect the Committee's desire to increase fuel efficiency. We would note that the recycling of metals saves, according to an EPA-sponsored study, between sixty and ninety-six percent of the energy used in making the identical product with virgin materials. Thus, we ask the Committee's assistance to achieve increased recycling or -- at minimum -- the Committee's help in ensuring that decreased energy consumption by automobiles is not achieved through increased land disposal of solid waste and sharply increased energy requirements through accelerated dependence on virgin substitutes.